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**MAGAZINE**VOLUME 6 NUMBER 2  
JANUARY 27, 1987

## Top Drawer Databases

### Power vs. Ease of Use

- DataEase
  - R:base System V
  - dBASE III Plus
  - PFS: Professional File
  - PowerBase
  - Q&A
- 
- PC Magazine's Third Annual Awards for Technical Excellence
  - Special Double Lab Notes: Double Your Directories
  - Stewart Alsop's Views on the Perfect Laptop

PROGRAMMING:  
FREE WORD COUNTER

# Borland's award-winning software is the best Holiday present you can give yourself or anyone else

**A**ny one of these Holiday presents could save your marriage, career, reputation and quite a few bucks.

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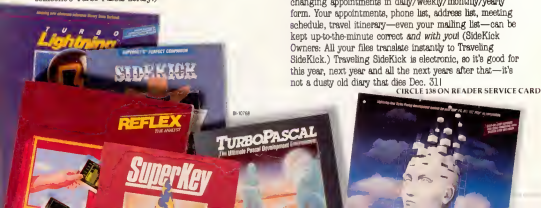
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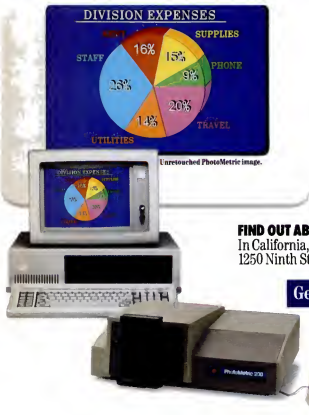
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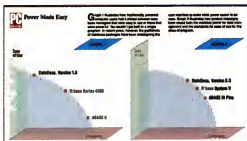
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Roberto Brosan

# WHAT'S INSIDE



Paul Somerson (right) presenting the award for laptop computers.

Industry awards, whether for the computer, automotive, or perfume industries, too often honor best-sellers or even heavy advertisers rather than the best products. When *PC Magazine* conceived the annual Awards for Technical Excellence 2 years ago, the goal was crystal clear: to recognize the developers, programmers, and

other behind-the-scenes individuals who advance the state of the art and expand the horizons of the PC. In many cases, that means honoring products that aren't (yet) household names.

*PC Magazine's* third annual technical excellence awards ceremony came on the opening day of the 1986 Fall Computer Dealer's Exposition (more commonly known as Comdex) in Las Vegas, the biggest computer show of the year, with some 80,000 attendees. Weeks of advance planning made the 2-hour ceremony run without a hitch—almost. Consider:

Among *PC Magazine's* award presenters, West Coast editor Stewart Alsop found his properly fitted size 44 tuxedo paired with size 34 trousers. Executive editor Paul Somerson, a veteran of dozens of user-group speeches, declared that speaking from the brightly lit Alexis Park Resort Hotel stage (the program was videotaped) was not unlike talking into the face of a 747 with its landing lights ablaze. And one of the award recipients, a Yank accepting on behalf of a Japanese engineering team and speaking extemporaneously, allowed as how it's important to "thank the little people." Another company, known by its three initials and believing it was a winner (in fact, the winners weren't revealed beforehand), had a photographer flown in for the occasion. The photographer never did shoot any pictures.

The award winners and their products are profiled in "Awards for Technical Excellence: PC Magazine Honors the Industry," starting on page 164.

In this issue's cover story, PC Labs project leader Joe Desposito and frequent contributor Alfred Poor present six of the most popular databases, three from the high-end (*dBASE III Plus*, *R-base System V*, and *DataEase*) and three from the ease-of-use arena (*Q&A*, *PFS:Professional File*, and *PowerBase*). These six represent the best of the best database managers.

Also in this issue, Bruce Brown examines the Avis of spreadsheets, *SuperCalc4*, and Richard Aarons reviews Clarion, a programming language that bridges the gap between traditional programming languages and programmable databases.

The First Looks section reviews the \$995 GammaFax, the first in a new product line of accessory boards that allow a PC to act as a fax machine.

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# LETTERS TO PC MAGAZINE



## CORE REVIEW CAUSES CONFUSION

Thank you for including Core International's HC150 Hard Disk in your article "The Core HC150: Fastest AT Hard Disk Alive?" (First Looks, page 54, *PC Magazine*, Volume 5 Number 18). I would like to compliment you on the review, and we, of course, are pleased with your conclusion that it is "literally the fastest drive available for the AT."

However, your reference to several of the manufacturers of our components has caused confusion. Some readers have assumed from the article that our controllers and drives are available from other sources. This is simply not possible. A standard CDC drive and a standard SMS controller will not function together without Core's modifications and added components. Only Core's HC150 drive and CNT-HC controller will produce your published evaluation results.

Core, like other firms, uses components from around the world in our manufacturing and assembly process. In addition, we do not always use the same component suppliers. We modify existing parts to such a degree that only the finished Core product has the engineering design, performance, and reliability *PC Magazine* and others have come to expect.

Hal D. Prewitz  
President  
Core International  
Boca Raton, Florida

## MANUAL DIALING WITH SMARTCOM II

In your cover story on communications software ("Asynchronous Communications: Shopping for Software," *PC Magazine*, Volume 5 Number 18), Barbara Krasnoff's review does not mention



*Smartcom II's* manual-dial feature, although it is shown that *Smartcom II* supports manual dialing in the Summary of Features table. The *Smartcom II* documentation does not reference it and the technical support at Hayes denies manual dialing is available. Do you know how manual dialing is done, or is this an error in an otherwise outstanding article?

Ralph Hoag  
Houston, Texas

Barbara Krasnoff replies:

*Actually, Smartcom II doesn't support manual dialing, but the program does allow it. If you use the F1 key to get to the on-line screen, and then type ATZ and Ctrl-6, you will get an OK from the modem. From there you can then use the ATD commands and have direct control of the modem.*

## LOOK NO FURTHER

I have been reading and enjoying Jim Seymour's column ever since it started appearing in *PC Magazine*. In the most recent issue, I was interested in getting a look at the review of our product, *PrintQ*, in First Looks, "PrintQ Juggles Jobs" (page 54, *PC Magazine*, Volume 5 Number 18). After reading that review, I skipped to Mr. Seymour's column "Great Pop-ups: The Public Sounds Off" (*PC Magazine*, Volume 5 Number 18), hoping to get some

ideas for our future software products.

It was while reading this column that I realized one of your readers, Richard Nolan of Arlington, Virginia, is looking for *PrintQ*. With *PrintQ* you can stop a file from being printed at any time, using *PrintQ's* pop-up status display. *PrintQ* would solve Mr. Nolan's problem, as well as many other printer control problems. In fact, *PrintQ* is a complete pop-up spooler with all the capabilities commonly found in the print spoolers used on mini and mainframe computer systems. Not only does our product have a pop-up status display, it also keeps each report separate and spools the print data to a file on disk.

Geoffrey Wiener  
President/CEO  
Software Directions  
Randolph, New Jersey

## IN DEFENSE OF ACCESS II

After reading Alfred Poor's review of *Open Access II* (First Looks, page 51, *PC Magazine*, Volume 5 Number 18), I had to take this opportunity to write in defense of this outstanding product. Since I am familiar with *Framework*, *Symphony*, and other similar programs, I found the approach of *Open Access II* refreshing. Certainly the data is not as tightly integrated, but the semi-standalone approach has its advantages and the graphics capabilities of the spreadsheet are superb. A computer neophyte can sit down with *Open Access II* and be effective and comfortable with it in far less time than with other packages, and at the same time, the modules have enough stretch to satisfy even power users.

John Allard  
Yakima, Washington

I would like to thank you for your "First

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## ■ LETTERS

Look" at our product, *Open Access II*. Mr. Poor recognized *Open Access II*'s power and wealth of features but was surprised to discover that *Open Access II* is composed of standalone modules. This may indeed be surprising to those who are used to thinking of integrated software as a spreadsheet with other applications appended, but it is not a shortcoming. *Open Access II*'s modules provide users with the power and functionality they need for database, spreadsheet, communications, and word processing applications. At the same time, *Open Access II* gives users the integration they require. *Open Access II* combines the power of standalone modules with the ease of learning and convenience of integration.

C. Fredrick Sehnert  
President/CEO  
Software Products International  
San Diego, California

## FILE SECURITY

In the column "Keeping Your Files Private" (PC Lab Notes, *PC Magazine*, Volume 5 Number 16), the author states that a cheap and simple way of creating illegal filenames that DOS will not process is through BASIC. There are a couple of errors in the accompanying example.

First, the NAME statement expects to see two strings as arguments, while the column shows them to be two literals. This would produce error messages.

Second, the column says that all you must do to use a file name is go into BASIC and NAME it with a legal name that DOS can handle. This is not so simple, as BASIC will give you a "Path not found" error. This persists regardless of the combination of drives and/or paths that are used.

Peter A. Westcott  
La Mirada, California

Winn L. Rosch replies:  
*Obviously Mr. Westcott is correct in his first remark. Sometime between the original manuscript and its final printing, quotation marks were lost in some of the program listings. Regarding the second problem, it should be made clear that whenever you venture too far from supported features of a language (for example, exploiting its quirks for copy protec-*

*tion or file security), you can't be completely certain that every version or revision of the language will act the same. Although IBM BASICA, Compaq BASIC, and Microsoft GW-BASIC all purport to be essentially the same, they apparently handle nonstandard filenames differently. We tested the published programs on an IBM compatible using GW-BASIC.*

## OBJECTIVITY CORRUPTED

Apparently Stewart Alsop has, as he says, gone near a Macintosh connected to an Apple LaserWriter and had his objectivity corrupted forever. How else can you account for his assertion that the industry is in the process of foisting a giant fraud on PC users, and that it goes by the name of desktop publishing? ("Is Desktop Publishing Fit to Print?" *PC Magazine*, Volume 5 Number 17).

First of all, the LaserWriter is not a "swift piece of hardware" as Mr. Alsop would have us believe. Printing a full page of mixed text and graphics can take as long as 20 minutes on the LaserWriter.

Also, Mr. Alsop's definition of desktop publishing adheres to the standard Apple hype, which is predicated on the ability to draw boxes, graphs, and all kinds of dingbats and mix them with various fonts. There are certainly a lot of other applications that can benefit from a laser printer, such as composing text for a newspaper, writing books, creating product manuals, and a wide variety of other tasks that don't require an expensive page-description language or LaserWriter. As an employee of a laser printing and publishing company, I have done all the above, using the "ilk of low-cost laser printers" that Mr. Alsop deplores, with very good results, thank you. Perhaps Mr. Alsop has been looking at a Macintosh screen too long. Maybe he ought to look around and see what is really happening before he embarks on his blatantly unfair criticism of an entire industry.

Ross A. Smith  
Santa Rosa, California

Stewart Alsop replies:

*Mr. Smith is clearly a professional whose income depends on being able to generate formatted documents from computers and laser printers. As such, he must know how those products work and value the speed at*



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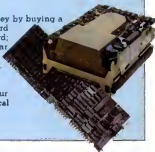
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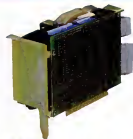
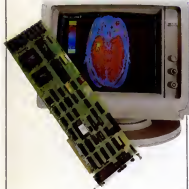
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## LETTERS

which he can make them work. Most people are willing to wait for good results, as long as they don't have to invest any extra time in learning how the system works. Quite frankly, I don't care whether Apple, IBM, Hewlett-Packard, or Pepsi Cola makes the stuff that I use, as long as they figure out how to solve problems for me, not create more of them. As it stands, though, Hewlett-Packard has done more to create problems for me (and most people I talk to) than the fairly hefty price of its printer and the headlines on its ads would suggest is reasonable.

## READERS COMMENT ON DVORAK

While reading John C. Dvorak's columns "Let's Modernize the Microcomputer" and Inside Track (PC Magazine, Volume 5 Number 18), I realized that his columns are the best things to come from the new computer world since the 256K chip. I am pleased that he has taken his rightful place at the head of the pack in your Viewpoints section.

David Ross  
Athens, Georgia

If the purpose of John Dvorak's column is to incite the computer masses to riot, he does an excellent job. Obviously, *tactful* is not a word in his vocabulary.

In regard to "Let's Modernize the Microcomputer," I find him overly eager to criticize IBM for what he considers its past mistakes. Where were Mr. Dvorak's thoughts when Big Blue was developing its first PC? If his crystal ball has all the answers, why did he stop with redesigning the keyboard when the computer was the next logical step?

Bob Ward  
Los Osos, California

I usually enjoy the articles and editorials you publish, but John Dvorak's style and content stick out like an extremely sore thumb. Is Mr. Dvorak as abrasive in person as he is on paper? While reading his column, I usually envision him as some overzealous snob you'd find at a convention spouting his theories and gossip as if you're really interested. Please send this guy back where you found him.

Bill Tift  
Miami Beach, Ohio

John C. Dvorak replies:

*Thanks for your input. I appreciate reader participation. Just wait until you read this issue's column.*

## INCOMPATIBILITIES DO EXIST

As publisher of *1.2.3 Forecast!*, one of the largest-selling Lotus templates and a *PC Magazine* Editor's Choice, I must point out that an "out of the box" copy of *1.2.3 Forecast!* did not function properly with *VP-Planner*. I believe Jared Taylor's comment that "there may be some tricky templates (*VP-Planner*) can't negotiate" ("1-2-3 Knockoffs: How Close Do They Come?" *PC Magazine*, Volume 5 Number 17) needs amplification.

In addition to those noted by Mr. Taylor, we have found that the differences between *VP-Planner* and Lotus's *1-2-3*, Release 1A, run from the trivial to the fatal. We have spent substantial time and effort locating and accommodating these discrepancies to guarantee compatibility of our Release 1A of *1.2.3 Forecast!* with *VP-Planner*. However, with other *1-2-3* templates, we definitely suggest that you try before you buy.

Bruce L. Gates  
President  
1.2.3 Forecast!  
Salem, Oregon

## CORRECTIONS/AMPLIFICATIONS

The cost of upgrading to the non-copy-protected version of *Graph-in-the-Box*, Version 1.2, is \$50 (First Look, page 46, *PC Magazine*, Volume 5 Number 19).

## HOW TO WRITE TO PC MAGAZINE

Do you have a comment, compliment, or criticism about something you've read in *PC Magazine*? A question you'd like to open up to other readers? Then send your opinion on paper or disk to Letters to *PC Magazine*, One Park Avenue, New York, NY 10016, or send your opinion through MCI Mail to PCMAGAZINE at address 157-9301. We're sorry we're not able to answer letters personally.

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Brief has text search abilities making "grep" with wildcards for matching, difference to intervening characters, acceptance of character ranges. If you use Lattice C86™ or Wizard, and have 386, you can compile your C program without ever leaving Brief. It finds the lines with errors, and marches you through the text file.

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All functions are in separate modules, only those used are linked. Only buffers holding on screen or temporarily obscured windows occupy RAM. Other released dynamically. Best overall rating in the latest display in Ball Harts 7-86 Tech Journal review of five windowing products.

Windows for C takes in data through the keyboard as well. At the high level is an encrypted menu of key-specific prompt string, field length, data type, screen location, picture, target to get, and several functions scrolling to get and process a user's input. There are utilities to get system date and time, mess with strings, create your own masks for fields.

Field options can require entry, prevent entry, permit repeat or overwrite, jumping on invalid or overflow keystrokes, and attachment of field-specific help messages.

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and functions you want called to display messages or validate entries. And you decide which key will clear a field, jump to the next or prior, quit, etc. Options diverse enough that a set of "fields" can be made to behave like a Lotus™ menu. Specify Compiler: **198 PC Brand**  
**T000 Windows for C 195 1449**  
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## MICROSOFT C 4.0 A Great C Battle Rages and You're Winning

As the dreadnaughts pound each other with ever better offense, today's programmers reap the spoils of the war. Bundling a source debugger and a "make" and sporting a "true" memory model (preventing single data objects larger than 64K, the Microsoft C compiler has jumped a full memory number to 4.0. But what's really impressive are the benchmarks reported in Dr. Dobbs (8/89) comparing a survey of 17 C compilers. Microsoft's and IBM's C (derived from Microsoft) run away with the contest winning 1 of 17 benchmarks.

The "code-view" debugger, free for a limited time, uses windows to show everything on one screen, source alongside disassembled object, variables, stack and registers. Drop down windows—use a mouse if you like—obscure learning of commands. A source-level debugger that puts the rest

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to shame? (Dobbs). Microsoft C now has five memory models for code and data, plus non-library support for other runtimes, and boasts alternate math packages for speed versus accuracy with or without 8087 8088 chips. A buy-in with multi-language support, built from this C runtime within in later versions of Most Pascal, FORTRAN, or Macro Assembler. Object code of all four may be intermixed, some link-time or commingled into libraries.

Both linker and library manager are part of the package as are the "make," a UNIX™ name for a script batch program which knows to expand minimum effort to rebuild any size of project by compiling and assembling only elements affected by new or changed modules.

It is reportedly used by Lotus, Astratec, and, literally, Microsoft itself to develop Windows. Dobbs calls it "the best MS-DOS C development environment value today (if, virtually any kind of program conceivable)." 333K suggested.

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Panel builds a user interface for keyboard movement within and between fields, supplies validation routines for

checking user field entries. Data-type attributes may be selected for any field—size, data type, color, conversion of input to upper case, clearance of existing data when new entry is started, masks for standard formats (e.g. dates), phrases which fill in when their first letter is typed, multiple-choice lists from which to choose by cursoring a highlighted bar. Twelve levels of multi-lined and scrolled if larger than the screen space allotted them. Specify: **50400 & Compiler** **Ask: 1285** Us **1229**

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## PFORCE Phoenix Function Festival

Lorac didn't do badly partly at all looking in one place. Phoenix has followed not the simple integrated C library, offering everything from low-level functions for hardware access to complete database management. Along the way are preprocessor such as string manipulation, time/date, field and screen editing, but also four types of menus (Lorac included), windowing, background tasking, DOS interfaces, directory management, even attempt-driven communications. Design emphasizes objects, so characteristics of windows, databases, records and fields can be instantiated and shared outside functions.

One large collection in place of bits and pieces means one set of instructions and **Phorce** has tutorials, extensive examples, quick reference, and can help.

Everything in source, no royalties. All memory models of Lattice. **Soft** Specify 30220 & Compiler List **475**, PCB **349**

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## DAN BRICKLIN'S DEMO PROGRAM Storyboard Your Program

**T**he Legendary One was created. Metaphor Two when the rest of us are still on Zero. Dan's first was the original, elegant **Storyboard** (VisiCalc). This one is for progressives.

Words don't express program ideas because programs are screens! Dan's Demo creates slide shows. Create a screen—a map of your planned program as it runs. Anything goes: words, borders, box rules, mouse and underlining of monochrome, text and background color. Copy the 'slide' to an empty screen. Change it a little, to show the next state of run-time. Do it again. Preset a whole slide show of your program in action. All 250 characters and attributes are available from accessible keys which pop to the screen. All commands are layered in Lotus-style pop-up menus. Frequent checkboxes mapped to function keys as well.

Box25 character mode, not bit-mapped. Screen areas can be blocked for cut and paste or filled with color or characters. Even blink. Slides can overlap others, can be shuffled, deleted. Slides can proceed at time intervals or branch anywhere in the slide sequence depending on user keyhits.

Invaluable to prototype the program you are about to write, to position the labels, choose the color decor, smooth out the keyboard interface. Or load the "capture" utility and snapshot the screen of any running program for an instant slide show.

Each copy entitles you to redistribute fifty of the slide projector program that runs demos. Plain manual, no border loops price of big product small. "Might become the essential tool in user interface prototyping." Tech Journal Ask for **N0120** List **725** US **69**

## BASTOC OPTIMIZES! Translates BASIC Into C

**F**or a trifling price, **BASTOC** moves truckloads of BASIC code over to C. It's a translator which sits in Microsoft Basic's command window and emits pure C. For Lattice 3.0 it will optimally convert your program into a single monolithic C function or decompose it into separate functions, one for each COSUB label. Version 2a optimization dramatically reduces execution time. Converts to integrates those variables in BASIC programs which do not need floating point. Where BASIC uses full-precision statements to increment counters, **BASTOC** converts to C's compact form. Saves dynamically allocated adding your application of BASIC's **CONCAT** holds for garbage collection. Cries out structure of even complicated BASIC code. Huge workhorse.

Ask for: List: PC Brand: **S0375 485 1399**

## Shopping List for the Power Workbench

ASSEMBLERS & DEBUGGERS		LIST	OURS	GRAPHICS		LIST	OURS
Advanced Trace-86 Morgan, ASM Interpreter		165	149	Essential Graphics by Essential, no royalties		250	210
CodeSmith-86 Debugger by Visual Age		635	145	ESB Graphics Development Toolkit		495	495
CDebugger by Micro-Systems Developers		965	139	GSS Kernel System by Graphic Software		495	375
CSD Debugger C source level by Mark Williams		75	75	GSS Kernel System for IBM RT		795	645
C-Sprite Debugger by Lattice, source level		175	139	GSS Satellite Interpreter		295	235
Microsoft Macro Assembler with Utilities		109	109	GSS Plotting System		495	375
PASIM86 by Phoenix, Macro Assembler		195	144	Help Graphics Kernel System		300	219
Periscope I Debugger Data Base Decisions		295	289	with Gr Halo II, by Media Cybernetics		400	295
Periscope II Data Base Decisions		129	111				
Plotted Plus by Phoenix, Symbolic Debugger		395	279				
BASIC LANGUAGE		LIST	OURS	COMMUNICATIONS		LIST	OURS
BetterBASIC Summit Software		99	165	AnyMesh Manager by Bases, for C or Pascal		175	149
BetterBASIC Utilities 8087 Math Support		99	85	Greenleaf Communications by Greenleaf		165	139
Brieve Interface		295	295	Phorce, Binary File Communicator		195	149
Run-Time Module		225	225	Software Horizons Pack 3		149	119
Microsoft BASIC Interpreter for XENIX		350	295				
Microsoft QuickBASIC Compiler full BASICA		99	99	UTILITY LIBRARIES		LIST	OURS
Professional BASIC by Morgan		99	70	Blaize C Tools Plus		175	149
RM/BASIC by Ryan/McFarland		60	49	Blaize C Tools		125	109
True BASIC True BASIC Inc.		150	119	C Food Screenshoted by Lattice		130	109
Run Time Module (Price slashed)		150	119	C Utility Library by Essential, 300 functions		165	139
True BASIC Libraries Brieve, Asyn, Sort, etc.		Var	Call	Greenleaf Functions by Greenleaf Software		165	139
				Phorce by Phoenix, binary library		175	149
				Software Horizons Pack 3		149	119
				TopView Tool Builder by Lattice, source avail		250	199
C COMPILERS		LIST	OURS				
C-86 Compiler Computer Innovations		395	289	DEVELOPMENT TOOLS		LIST	OURS
Lattice C Compiler from Lattice		500	299	Code Sifter by David Smith Software, Profler		119	99
Let's C Compiler by Mark Williams		75	89	C-Worthy by Custom Design Software		295	299
with CSD Source Level Debugger		150	129	C-Worthy for Network Memory, help, errors		495	449
MWC-MC, Mark Williams C Development		495	369	Dan Bricklin's Demo Program Prototypizer		75	69
Microsoft C Compiler 4.0		450	295	LMK from Lattice by Lattice, "make" like UNIX		195	149
C INTERPRETERS		LIST	OURS				
C-Trip by Gimpel Software		300	249	Microsoft Windows Development Toolkit		500	365
Instant C by Rational Systems		500	395	PC-Lite by Gimpel Software, after UNIX's "ln"		300	249
Interpretive C by IMAPAC with debugging		249	199	PFInish by Phoenix, EKE performance analyzer		395	279
RUN/C Professional from Librosoft		250	185	Pinfish Plus Utilizes memory for overlays		495	399
RUN/C without Loadable Libraries		120	109	Printer by Phoenix, like UNIX "lpr"		125	105
TEXT EDITORS		LIST	OURS				
Brief from Solution Systems		195	169	Printout Pac for Phoenix products		1295	895
Emulation by Logica Software, the EMACS		295	289	OTHER TOOLS		LIST	OURS
FirstTime by Source Technology, C syntax		225	225	BASTOC by JMT, convert BASIC to C		495	399
LSH by Marsfield, similar to Xedit		125	115	BASIC-C BASIC's functions added to C		175	139
KLIT, the Lattice Screen Editor Multi Window		125	100	The HAMMER by QES Systems		195	179
Pinella by Phoenix, multi-window		149	119	Report Option by Softcraft, Brieve Report Gen		145	129
Pinella by Phoenix, multi-window		149	119	Xtrieve by Softcraft, Query Utility for Brieve		245	220
Red by Computer		150	119				
Vedit Plus by Compuser		225	160				
FILE MANAGERS		LIST	OURS				
Brieve by Softcraft, no royalties		250	195				
FileView Network by Softcraft		595	449				
FileView by FaxCom - no royalties, source		395	329				
cdBASE file manager from Lattice		250	195				
cdBASE single user DBMS by Rama		500	329				
cdBASE multi-user DBMS		495	429				
Opt-Text Sort Can sort Brieve files		145	119				
SCREEN MANAGEMENT & DESIGN		LIST	OURS				
Curves by Lattice, UNIX screen designer		125	99				
Greenleaf Data/Windows New		395	295				
with Source simultaneously		395	295				
Source purchased later		145	119				
On-Line Help from Opt-Text		245	195				
Panel by Roundhill, no royalties		295	225				
View Manager for C by Bases		275	209				
Screen C or Creative Program		139	109				
Windows for C Microsoft Creative Software		195	149				
Windows for Data includes Windows for C		295	259				
ZView Data Management Consultants		245	199				





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PC Magazine

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## ■ GUS VENDITTO

## PC ADVISOR

*Help in selecting a presentation-graphics program for creating scientific charts from 1-2-3 and in finding a screen-blanking utility.*

**SCIENTIFIC CHARTING**

I plot scientific data from 1-2-3 files on an HP 7470A plotter into multiple line x-y graphs with error bars. The program I am now using is limited in labeling control and I'm forced to draw in error bars by hand. I'd like to produce publication-quality graphics and have a what-you-see-is-what-you-get view before printing. I'm willing to change some hardware (our department may purchase a laser printer), but I would like to avoid transferring my data files.

Nicholas J. Berg, M.D.  
Rochester, Minnesota

*I wouldn't be so quick to surrender an HP 7470A plotter. It sounds like you haven't even scratched the surface of its great eye-pleasing potential, and you'll never do that with 1-2-3's stripped-down graphics. You need a presentation-graphics program that can chart more than the six lines possible in 1-2-3 and will allow you to customize every bit of the text.*

**EnerGraphics, Version 2.01** (Enertronics Research, St. Louis, Mo.; (800) 325-0174; \$395), can chart up to 15 lines in a graph (with 350 data points per line). Not only can you put labels where you want, you can size them or add 3-D shadow. It accepts only .DIF files from 1-2-3, which is a small inconvenience. (The company promises an upgrade will read .WKS files later this year, so be sure to register if you buy.)

Freelance Plus is Lotus's own presentation package (the original Freelance, created by Graphic Communications International, enhanced 1-2-3 graphs so well that

*Lotus bought the company and further developed the program's features). It doesn't have EnerGraphics's amazing data-charting strength (a maximum of eight lines per chart and 120 data points per line)—its specialty is illustrative add-ons. But it offers excellent free-hand drawing support and reads .WKS files (Lotus Development Corp.; Cambridge, Mass.; (617) 577-8500; \$495).*

Harvard Presentation Graphics is easier to learn than these two and offers slightly less charting capacity (60 data points per line, eight lines per chart), but it should do the job. It reads defined ranges directly from 1-2-3 .WKS files (Software Publishing, Mountain View, Calif.; (415) 962-8910; \$395).

There are dozens of other presentation-graphics programs, but you won't go wrong with these three. By the way, if you're publishing your graphs, you should look into the Polaroid Palette to save your

graphs as color slides—these programs all support it (Polaroid Corp., Cambridge, Mass.; (800) 225-1618; \$1,999).

**SCREEN BLANKERS**

We are upgrading our monochrome screens with Hercules adapters to IBM EGA displays. The Hercules software has an optional screen blanker, turning off the display if there's been no input for 5 minutes or so, preventing screen images (such as spreadsheet borders) from burning out the phosphors. We need a utility to do the same with our EGAs and have been unable to find anything to date.

L.P. Blood  
Wellington, New Zealand

Phosphor burn was a problem only for early monochrome displays and should not trouble an IBM EGA display. However, a screen blanker will cut power draw slightly, saving a tiny amount of electricity, and could add to the life of the display. Many programs offer this utility almost as a bonus. Since you're using spreadsheets, try Cruise Control (Revolution Software, Randolph, N.J.; (201) 366-4445; \$39.95). It's an adjustable cursor-key speed-up utility. Or order one of PC-SIG's libraries of utilities; disk no. 126 has a screen blanker and other tools (Sunnyvale, Calif.; (800) 245-6717 or (408) 730-9291; \$6 per disk, plus \$4 shipping).

■ A screen blanker will cut power draw slightly, saving a tiny amount of electricity, and could add to the life of the display.

**ASK THE ADVISOR**

Send your questions to PC Advisor, PC Magazine, One Park Avenue, New York, NY 10016.

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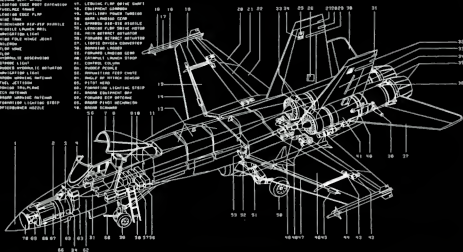
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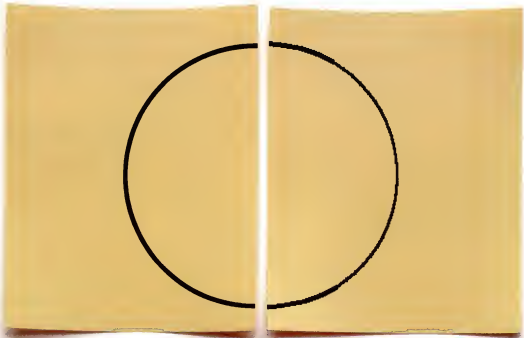
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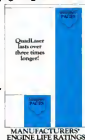
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**PC**  
 MAGAZINE

# FIRST LOOKS

## NEC MultiSpeed: Speedy, Feature-Packed Laptop

**PC HANDS ON**

BY PAUL SOMERSON

The battle for your lap is heating up. NEC Home Electronics, whose MultiSync monitor captured the EGA market (with sales of 55,000 units per month), has stolen a march on the competition with its supercharged MultiSpeed portable.

The MultiSpeed combines raw, flat-out performance with one of the best keyboard layouts of any laptop, a 128K-byte battery-backed static RAMdisk, and half a megabyte of pop-up

firmware. NEC sells the whole works for under \$2,000—hundreds less than similar boxes from Toshiba or Zenith and about the same as IBM's lackluster Convertible.

Under the hood is a CMOS V-30 CPU—NEC's optimized version of the Intel 8086—running (and I mean running) at a breakneck 9.54 MHz. It leaves the former speed champ 7.16-MHz Toshiba T1100 Plus (and even the standard IBM PC AT), eating its dust. You can also choke it down to the PC's sluggish 4.77-MHz clock speed, but why would you?



The MultiSpeed's 85-key keyboard gives you a separate cursor pad and function keys the way IBM intended.

### Key Differences

Its crisp 85-key keyboard, with separate numeric/cursor

keypad, and two columns of full-size function keys where they belong at the left edge of the machine, is a far cry from the toylike mush in much of the competition. With other machines you have to retrace your fingers; here just about every key is in its familiar location. Bright red CapsLock and NumLock LEDs leave no doubt about the shift status. The designers know what users like. They even scooped out the home-row F and J keys a bit better than the rest, a nice touch. And they added a conve-

(continues on page 34)

## 386 Assembler and C Compiler Break 64K Segment Limit

**PC HANDS ON**

BY CHARLES PETZOLD

Phar Lap Software and MetaWare have released 80386 programming tools that allow software developers to create applications that run in the protected mode of the 80386 microprocessor on machines such as the Compaq Deskpro 386. By running in 80386 protected mode, programs can use 32-bit offset addresses for accessing code and data without running into the real mode's 64K-byte segment limit.

The Phar Lap 386/ASM package includes a macro assembler that supports the ex-

tended 32-bit registers and additional assembly language instructions of the 80386. The object modules from these programs may be linked normally to run in 80386 real mode. (This results in more-efficient code and faster execution time for operations involving 32-bit data types.) Alternatively, Phar Lap's 386Link linker prepares programs for running in protected mode under their Run386 environment.

Run386 creates a single large segment containing program code, data, and the stack and switches to protected mode. A program running under Run386 can continue to execute most MS-DOS Interrupt 21h calls.

(BIOS calls that do not require addresses may also be executed.) For DOS calls, Run386 translates addresses between protected mode and real mode, then switches to real mode, calls DOS, and then switches back to protected mode when the DOS call has been completed. Programs also have direct access to the video display memory buffer and other memory areas within conventional memory.

Phar Lap is planning to release a product called 386/DOS-Extender that will remain resident in memory and allow programs linked under 386Link to be directly executed without the Run386 utility. Under the

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## NEC

(continued from page 33)

nient Help key in the very lower right-hand corner. About the only real gripe is that the Enter key is a bit small.

Many other portables skip on the keyboard, which means some keys have to perform double duty. With limited computers like these, just as with IBM's ill-fated PCjr, you have to lean on extra color-coded Shift keys to get any serious work done. The NEC's dedicated number/cursor pad eliminates this problem. And its ten function keys are implemented exactly the way IBM intended.

## Power-Packed

Packed standard inside the MultiSpeed's 11 pounds are parallel, serial, RGB, and external floppy disk ports, as well as 640K bytes of RAM, twin 3½-inch double-mounted floppy disk drives, and 512K bytes of ROM-based applications (outliner, file manager and report writer, notepad with spelling checker, dialer, communications program, and setup program). A sturdy handle slides into the back of the machine, which sports naked, uncovered ports, a small bank of hardware configuration switches, and a tiny reset switch.

A large, easily accessible, click-in nickel cadmium battery keeps everything humming for 4 to 6 hours and is supplemented by a smaller battery that powers



The superthin LCD screen could be better; NEC opted for longer battery life rather than backlighting. However, the screen is detachable.

128K bytes of static RAM and maintains the internal phone directory, clock/calendar, and hardware configuration settings, as well as the contents of a nonvolatile RAMdisk. You can cut down on power consumption by parking the floppy disk drive controller electronics. Two warning levels alert users to save their work when the charge is low. A red LED begins to flicker when the battery is down to 20 or 30 minutes and grows more insistent with time. When the countdown reaches 5 minutes, a second alarm kicks in as the MultiSpeed beeps and flashes nagging messages on-screen.

## Easy Data Transfer

NEC research predicted that most prospective MultiSpeed buyers would already own full-size DOS computers. Instead of requiring that buyers purchase external 5¼-inch floppy disk drives to transfer data in and

out, the machine's designers slapped a port on the back that connects the laptop to a desktop. An optional \$99 external transfer cable kit hooks up to the external floppy controller port on PCs and XT's and tricks the desktop into treating the MultiSpeed's two 3½-inch drives as additional desktop drives. AT owners, who lack this external port, can purchase a serial transfer kit (also for \$99) that can shuttle data back and forth at about 115,000 bits per second. Even the parallel port can serve double duty as an I/O port, operating in special applications at speeds up to 100,000 bps.

As with much freebie firmware these days, the MultiSpeed's pop-up package isn't a compelling reason to run out and buy the machine, but it's handy once you have it. A notepad (especially one with a 20,000-word non-real-time spelling checker) and filing program are always desirable. The

dialer is built to call other people's phones, not their modems, and works only with the optional (\$399) internal 300/1,200-bps Hayes-compatible NEC modem. It's smart enough to know which numbers you call most frequently and shuffle these to the top of the dialing menu. A separate, full-fledged communications package handles both voice and data transmission. NEC also threw in an outliner but threw out a calculator, conspicuous by its absence.

The setup program allows software/keyboard control over just about every aspect of the machine. You can partition off buffers for all firmware applications at bootup and then access them instantly with the Pop-up key. Or you can run them one at a time at the DOS command line. Running them as pop-ups hogs memory space (which you can adjust up or down) but lets you freeze commercial applications and jump to one or more pop-ups. You can even freeze the pop-ups and jump back to the application. And a safety feature prevents you from turning the computer off while something is frozen unseen in the background, although you can bypass this by pressing the back-panel reset button. All the applications come with their own clear, context-sensitive help screens. While the factory setting chews away a fairly large chunk of memory for this (leav-



### Benchmark Tests: NEC MultiSpeed vs. Zenith Z-181 Portable PC and Toshiba T1100 Plus

The NEC MultiSpeed takes top honors for processing speed when compared with its current laptop rivals. The Zenith Z-181's disk access time, though, is still the one to beat. (We tested the MultiSpeed and Toshiba T1100 Plus in their fast modes; the Z-181 runs only at 4.77 Mhz).

## Performance Times

(Times given in seconds except where noted)

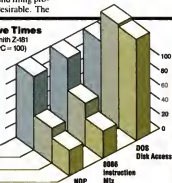
Product	NBP	8088 Instruction M/s	DOS Disk Access (milliseconds)
Zenith Z-181 Portable PC	10.55	32.90	215.15
Toshiba T1100 Plus	5.00	19.00	303.00
NEC MultiSpeed	3.73	12.36	296.60

The NBP benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in macroinstructions and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instruction in a big 128K loop. The 8088 instruction M/s benchmark test measures the

time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the Intel processor instruction set. The DOS Disk Access benchmark test measures the time it takes to do a random sector read using DOS. DOS

## Relative Times

(Ratio: Zenith Z-181 Portable PC = 100)



buffers are set at 3 and the interface factor is left at the drive's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.



# GammaFax Links Dedicated Fax Machines with PCs



HANDS ON

BY FRANK J. DERFLER, JR.

The large base of dedicated fax machines sitting in thousands of offices around the country, communicating only with each other, is a private party about to end. GammaLink's \$995 GammaFax is the first arrival in what promises to be a series of new products offering a relatively inexpensive way to add Group III facsimile capability to any PC.

The GammaFax package consists of a three-quarter-length board capable of 9,600-bit-per-second synchronous communications and a disk with six programs that facilitate PC-to-fax communications and synchronous file transfer with other GammaFax boards.

Installation is as easy as sliding the board into the PC and connecting it to the telephone line through its single jack. This is a simple job, but GammaLink could have made it even more so if it had followed the example of modem manufacturers and included two telephone jacks on the card: one for the line and one for the phone. The instructions make it clear that providing a Y-connector able to handle both the phone and fax device is the responsibility of the installer.

The limits on facsimile resolution are imposed by the capabilities of the scanner on the sending end and the printer on the receiving end. One advantage of a PC-based system is that documents transmitted directly from ASCII files by the GammaFax system are of better quality than those transmitted by a standard fax machine because they don't suffer a loss of resolution during scanning.

However, the quality of documents received by GammaFax is slightly below that of a standard fax machine because the software supports only one low-resolution dot matrix printer: the IBM PC Graphics Printer (and compatibles). GammaLink does not offer an interface for

laser printer systems, and there is no option on the menu to create an ASCII file from the compressed file.

The bottom line, however, is that printer resolution is not the overriding factor in determining the quality of a received fax document. The quality of the original document, noise on the telephone line, and the scanning process can all have more effect on the quality of the final product than the printer. Given these factors, the IBM PC Graphics Printer is adequate for fax output, but it would be nice to have a laser printer option for better quality.

## 80-Second Conversions

The six programs supplied with the board smooth the fax

connection. One program converts ASCII files into facsimile-format files for transmission, taking about 80 seconds on a 4.77-MHz PC to convert a page of text or graphics. Another program grabs video screens for transmission; however, our tests found the capabilities of this program limited to graphics programs that terminate and leave an image on-screen. Since most graphics programs clear the screen before termination, this utility doesn't seem to be very useful.

The GammaFax system gives you a limited ability to display fax-format files on a CGA, EGA, or Hercules system. The display is really only good for looking at the format of the transmitted text. It is diffi-

cult to read the letters on the screen because they are compressed for transmission.

Documents received from a standard fax machine appear in the same compressed format, but they print out normally on an IBM PC standard graphics printer. You can use *Dr. Halo II* to cut and paste fax images.

GammaLink also includes a program that interfaces with a Canon IX-12 scanner.

Accessed through a tiered menu system that makes good use of function keys, these programs are all easy. If you get stuck, detailed help screens describe the menu options.

## Fax Phone Directory

Telephone numbers of frequently called fax machines can be stored in a directory that you can create with your word processor. It is easy to set the system for unattended reception.

GammaFax provides a useful capability at a fair price. The product would be far more useful if it could work in the background. Since facsimile machines typically stay on-line in auto-answer mode at all times, this would double the value of the PC by freeing it for standard tasks.



The GammaFax three-quarter-length board has a line jack but no phone jack.

All of the program structure for preparation

All of the program structure for preparation

Scanning on the transmitting fax machine causes a loss in resolution in fax copies: above left, a fax-to-fax document; right, a PC-to-fax copy.

## Fax Technology: A Private Party About to Be Crashed

Facsimile is a fast and economical way to send black-and-white paper images across town or around the world. A transmitting fax machine scans a piece of paper, ignores white spaces, and sends out information describing the image in terms of the position of high-resolution dots over telephone lines. A receiving fax machine reproduces corresponding dots on paper, usually with a quiet thermal-printing device and heat-sensitive paper.

The advantage of facsimile is its ability to transmit a total picture of a scanned page, complete with letterhead and diagrams.

Fax machines are classed by transmission speed. The

CCITT (an international communications committee) has established standards for scanning and encoding (Group I, II, III, and IV) and for transmission signaling (V.27 and V.29). Transmission speeds vary between 1,200 and 2,400 bits per second, and most machines can fall back to lower speeds to adjust for poor line conditions. Unattended transmission and reception are standard features.

Group III is the current standard. Group IV is faster, but its need for dedicated lines severely limits its appeal.

The cost of a Group III fax machine ranges from \$2,495 to \$10,000.

—Frank J. Derfler, Jr.

## PC FACT FILE

### GammaFax

GammaLink

2452 Embarcadero Way  
Palo Alto, CA 94303

(415) 856-7421

List Price: \$995

Requires: 256K RAM; RJ-11C or RJ-45B phone plug; CGA, EGA, or Hercules graphics card; DOS 3.0 or later.

In Short: An inexpensive way to add facsimile capability to a PC. GammaFax could be improved by the ability to operate in the background.

CIRCLE 623 ON READER SERVICE CARD

# EasyLAN—Networking For Less Than \$100 Per PC

STOP buying expensive duplicate PC peripherals. Usually your peripherals just sit idle. If your office owns two or more PCs can you justify costly laser printers for each PC? How often are your printers actually busy? Thirty minutes a day? An hour a day? Even your expensive hard disks are used infrequently.

The obvious solution to avoid expensive duplicate peripherals is a local area network that allows you to share printer and disk drives. But until now LANs have cost in excess of \$1,000 per PC.

## THE EasyLAN™ OFFICE NETWORK

EasyLAN shares printers and disk drives between IBM PCs. EasyLAN can save you \$1,000 or more per PC by eliminating duplicate equipment purchases.

### EASYLAN HIGHLIGHTS

- EasyLAN shares printers, plotters, data, and disk storage
- PC to PC file transfer
- Print spooling
- New PBX support
- Easy to install
- Easy to operate
- Modem support
- Performs in the background

EasyLAN's low price matches the small business user's cost-sensitive budget. It is the office network solution for less than \$100 per PC including cables and software for a 2 PC or 3 PC network.

EasyLAN performs its operations concurrently in the background. EasyLAN communications, file transfers and printer operations all take place while each PC simultaneously performs such normal DOS applications as Lotus 1-2-3™, WordStar™ and dBASE™.

### NEW PBX SUPPORT

New PBX support allows EasyLAN to transfer data files and share peripherals between PCs using PBX circuit-switched connections and twisted pair wiring. EasyLAN has already been installed on a number of different PBX systems and has been certified by Northern Telecom on the Meridian SL-1.

EasyLAN's performance meets your small of office or department requirements to move word processing documents and spread sheets between PCs. For example, EasyLAN can transfer a 10 page document between PCs as a background operation, in less than one minute.

EasyLAN loads automatically at boot time. It manages the PC's serial and parallel ports for communications and printing.

*"The value is high."*  **InfoWorld Report Card**

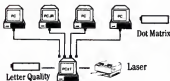
Printer sharing operates transparently with existing programs. Print files are automatically spooled to disk and scheduled for printing. Multiple printers per PC may be designated for specific office tasks.

*"I bought access to a laser jet printer for \$80."*

—CONOCO Oil User

Disk sharing uses EasyLAN's EZCOPY command to move files to and from PCs. ASCII or binary files can be transferred in the foreground, or in the background while other DOS programs run.

All communication operations are protected by a unique password assigned to each PC so security is maintained.



EasyLAN Office Network

### EASYLAN SPECIFICATIONS

Each PC in the network requires an individual licensed copy of the EasyLAN program and takes 20k of memory on each satellite PC, a serial port, and DOS 2.0 or above. EasyLAN disks are not copy protected. EasyLAN runs on all IBM PC models and Compatibles. The HUB PC requires a serial port for each satellite PC. The COM2 and COM6 boards are serial port expansion boards which permit you to add serial ports to the HUB PC.

### EASY TO INSTALL

EasyLAN can be installed in less time than it takes to enjoy your coffee break. Just plug the EasyLAN cables into existing serial ports. The EasyLAN Network Configuration Program provides a menu driven installation program that will guide you step by step through the software installation process.

### EASY TO ORDER

EasyLAN is a proven product with over 12,000 installations. To order just call toll free 800/835-1515. Start with a two PC network and expand as your needs demand.

*"If it does all you need why spend more? It is the ultimate example of practicality in a local area network."*

—PC Magazine

### PRODUCT SUPPORT

We take pride in our quality product support. EasyLAN support is provided over the telephone by the same people who installed over 12,000 networks last year.

*"I look for products that make my job easier and save my company money. EasyLAN does both."*

—Mini Micro Magazine

## EasyLAN

ORDER TODAY 1-800/835-1515 in CA 408/738-8377



### EasyLAN Order Form

To Order by Phone—Call 800/835-1515  
In CA 408/738-8377  
For Configuration Assistance & Technical Questions  
Call 408/738-8377

### Place your Order Immediately Dealer Inquiries Invited

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_  
Telephone (\_\_\_\_\_) \_\_\_\_\_  
Payment: Visa, MasterCard, Check, COD, Bank Draft  
Name on Credit Card \_\_\_\_\_  
Cr. Card No. \_\_\_\_\_ Exp Date \_\_\_\_/\_\_\_\_/\_\_\_\_

Item	Description	Price	Qty	Amount
EL 01	EasyLAN Kit— for 2 PCs 30' cable, two disks & manuals	\$179.95	_____	\$ _____
EL 02	EasyLAN Expansion Kit—for 1-PC 30' cable, one disk & manual	\$109.95	_____	\$ _____
EL 11	EasyLAN disk & manual (3 1/4" disk \$89.95)	\$ 79.95	_____	\$ _____
EL 12	EasyLAN 30' cable	\$ 49.95	_____	\$ _____
EL 13	COM2 serial port expansion board, two ports	\$219.95	_____	\$ _____
EL 14	COM6 serial port expansion board, six ports	\$489.95	_____	\$ _____
EL 15	Custom length cables, call for quote		_____	\$ _____
	CA res add applicable sales tax		_____	\$ _____
	Shipping charge USA \$10.00,		_____	\$ _____
	other \$20.00		_____	\$ _____
TOTAL ORDER				\$ _____

Server Technology, Inc., 1095 East Duane Ave. #103  
Sunnyvale, CA 94086 Telex 5106093481



# Electric Pencil PC: A \$50 Text Editor

## PC HANDS ON

BY CHRISTOPHER JOHNSTON

When Electric Software Corp. released *Electric Pencil PC* in 1984, it was ambitiously priced at \$299.95. Peripheral packages, including a tutor, a dictionary, and an advanced console editor brought the fee over \$600.

All those extra features have been improved and integrated into the new \$49.95 *Electric Pencil PC*—not a bad price for a professional word processor that includes split screens and a spelling checker.

Next to its low price, *Electric Pencil's* big advantage is its ease of use. You perform basic editing chores with Ctrl-key combinations that are familiar to any *WordStar* user. The 100,000-word dictionary is as good as most any on-line proof-

reader. Users unfamiliar with *WordStar* key functions will appreciate the four levels of on-line help, the witty and well-written manual, and the interactive tutor.

The bad news is that *Electric Pencil* operates primarily in

overwrite mode. It supports insert mode, but only for one continuous stream of text, like Microsoft's BASIC editor. Once you stop typing and hit Return or use the cursor keys to move to another line, it automatically turns insert mode off. This flaw

Electric Pencil PC has both full and abbreviated menus, as well as context-sensitive onscreen help accessible from any point in text entry. This makes it a good program for the novice user.

Cap Lock: Off	Num Lock: Off	Underline: Off	Bold: Off
1 Cursor up	HOME	Screen start	DD Screen and
2 Cursor down	END	Text start	Text and
3 Cursor right	HOME	Text start	Text and
4 Cursor left	END	Text start	Tab left
5 Delete char	←	Delete block	↵ Soft/Swap
6 Insert char	→	Insert block	↵ Soft & cont
7 Insert mode	←	Scroll up	↵ Harder set
8 Insert mode	→	Scroll down	↵ Harder jump
9 Delete line	←	Back space	↵ Tab left
0 Insert line	→	Back space	↵ Tab right
1 Break to EOL	←	Back space	↵ Pencil tutor
			↵ Sys menu
			↵ Print menu
			↵ Form feed
			↵ Hard space
			↵ Repeat
			↵ Help
			↵ Key record

*Electric Pencil PC* shares many *WordStar* Ctrl-key combinations, there are four levels of help for accessing the program's functions.

## PC FACT FILE

### Electric Pencil PC

Electric Software Corp.  
9230 Markville Dr.  
Dallas, TX 75243  
(214) 234-8466

List Price: \$49.95

Requires: 128K RAM, one disk drive, DOS 2.0 or later.

In Short: An easy-to-use professional word processor with a dictionary and lots of on-line help, but it operates primarily in overwrite mode. Worth \$50. Not copy protected.

CIRCLE 408 ON READER SERVICE CARD

doesn't really hurt the program's value as a tool for composing short letters or editing text, but it almost ruins the program as a writing tool.

# New Drives for Downsized Disks

## PC HANDS ON

BY WINN L. ROSCH

You can do quite a lot with 3½-inch floppy disks that you can't with the standard 5¼-inch size. The tough-shelled disks are destined to inherit the world of PCs—they are sturdier, have higher capacities (720K bytes), and operate in smaller, lower-power disk drives that will fit into tomorrow's inevitably downsized PCs.

Owners of a 3½-inch-equipped laptop are already itching for easier access to the pygmy platters, and until recently, only IBM's \$395 external and \$190 internal drives were available. A new pair of drives from Toshiba America and Maynard Electronics make the tiny disks more affordable.

The Maynard Model 80310 external drive, priced at \$350, measures only 2 inches high, 4 inches wide, and 7 inches deep. It's based on a TEAC drive and

designed to plug into the expansion jack on the retaining bracket of the standard PC (or XT) floppy disk controller. Maynard includes a large black external transformer box that nearly outweighs the drive itself to provide the necessary 2.9 watts.

Hardware installation is a simple matter of plugging the data and electrical cords into their sockets.

The \$150 Toshiba Model ND-354A is a bare drive. At 1½ by 4 by 6 inches it will not fit into the drive bay of any IBM computer except the PC Convertible. However, Toshiba supplies a kit with all the necessary adapters and cables you'll need to install it in any IBM and most compatible PCs.

Both the Toshiba and Maynard drives operate under DOS 3.2 only. The newer operating system is designed with built-in 3½-inch drive support. The only extra step required is adding a special disk driver (included with DOS 3.2) to your sys-

tem's CONFIG.SYS file.

The Toshiba Model ND-354A can be installed in place of drive A: in any system and, when loaded with a system disk, will boot your computer like any other drive. Because the Maynard plugs into the external drive adapter, it appears as the third floppy disk drive, which cannot boot the host. For those who want to put the puny drives into primary service, Maynard offers another model that is internally mounted, the Model 80300, which duplicates all the functions of a full-size drive, including booting the host.

With the exception of double capacity, these little disk drives are the functional equivalents of their larger floppy disk drive siblings. Both spin their little disks at 300 rpm and transfer data at 250 MHz, exactly the same as ordinary floppy disk drives. In operation, they even sound like ordinary floppy disk drives—grinding and growling when indexing and chattering

## PC FACT FILE

### Maynard Model 80310

Maynard Electronics  
460 E. Semoran Blvd.  
Casselberry, FL 32707  
(305) 331-6402

List Price: \$350; Model 80300 (internal), \$250.

Requires: DOS 3.2.

In Short: An external chassis 3½-inch floppy disk drive with external power adapter.

CIRCLE 401 ON READER SERVICE CARD

### Toshiba Model ND-354A

Toshiba America Inc.  
Information Systems Division  
2441 Michelle Dr.  
Tustin, CA 92680  
(714) 541-1062

List Price: \$150

Requires: DOS 3.2.

In Short: An internal 3½-inch disk drive.

CIRCLE 402 ON READER SERVICE CARD

between tracks—but with suitably miniature noises.

# Interoffice Memo.

A single MaynStream™ backs up  
all the PCs in your office,  
file by file!



## Protecting Files: Top Priority.

Hard drive users learn fast how indispensable tape backup really is. But equipping each of your PCs with its own backup system is a costly way to go. That's why we developed the MaynStream, our lightning-quick, *file-by-file* tape backup. When you've backed up one PC, just detach the MaynStream's Quick-Release Cable and snap it onto any other PC equipped with a low-cost MaynStream controller. Simple menus will guide you through another backup in seconds. And restoring data is just as easy. So when your hard drive forgets to treat your files like your business depends on them, the MaynStream remembers.

## Backup That Won't Back Down.



The MaynStream is small, lightweight, and big on performance features. Its rugged design and convenient carrying handle make multi-PC backup a breeze. And talk about fast! Backup takes just 3 minutes\* for the average 10MB drive (that's file-by-file, and it's still faster than the now antiquated image mode technology)! The MaynStream uses handy data cassettes small enough to slip into your shirt pocket. Available in 20 and 60 MB models.

## Other Powerful Systems for the PC.



MaynStream internal,  
available in both  
20MB and 60MB  
models.

MaynStream 600  
internal, available in  
60MB model.

MaynStream portable,  
available in both  
20MB and 60MB  
models.

MaynStream 600  
portable, available in  
60MB model.

Transport Plus™  
portable combination  
20MB hard drive and  
20MB tape backup.

Transport™ 20MB  
portable hard drive

All Maynard systems are backed by our 1-year warranty.

Sold at the finest computer stores. Contact your local dealer or write to us today for product information.



## Maynard Electronics

Shaping tomorrow's technology.

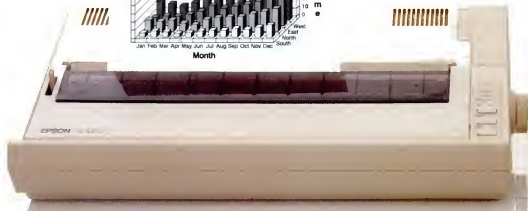
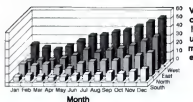
CIRCLE 478 ON READER SERVICE CARD

460 E. Semoran Blvd., Casselberry, FL 32707 305 331-6402

\*Actual time 2min 53sec. Total files backed up 376 consisting of 10,002,432 bytes. Computed on IBM PC with 512K memory and one 10MB hard disk drive. Your actual backup time may vary. IBM PC is a trademark of International Business Machines.

# OTHERS PALE B

## SHIPMENTS BY MONTH



The small printer on the left seems positively unexciting next to the new ALPS ALQ300.

And it's not just because of our colorful personality.

You see, the ALQ300 is a lot faster. It handles bidirectional graphics with flying colors. And for black and white work—spreadsheets, letters, you name it—the ALQ300

zips along as fast as 240 cps.

It can do more things. It has snap in/out 24- or 18-pin print heads. Multiple font cartridges. Paper handling extras like auto-

matic single sheet feed and bottom feed. And of course, it runs with all the most popular PCs and software.

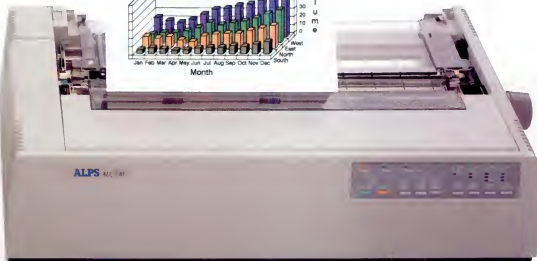
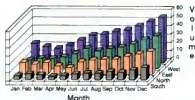
It's much easier to use, too. Because you do everything

Both offer the same great features. First dot matrix printers with resolution quality. They quietly print at 240 cps. They're versatile. A full range of models, transparencies, multiple-part forms, pitches and fonts.

*The ALQ300 prints everything from the letter quality text you see here, to high resolution graphics in seven colors.*

# Y COMPARISON.

SHIPMENTS BY MONTH



on the front panel. Change type styles and print modes. Load paper. Even override your software. All without software commands or DIP switches.

You may have also noticed that the ALQ300 looks more substantial. It is. Treat it right and it'll run over five years without a breakdown.

You may also expect that the ALQ300 is more expensive. It isn't. Our 24-pin version has a suggested retail price of just \$995.

And our 18-pin model is \$100 less.

Now it's time to make your own comparison. Call us for a free demo or more information at (800) 828-ALPS. In California, (800) 257-7872.

And you'll find there really isn't any comparison to make.

**ALPS**  
AMERICA

**IT'S TIME YOU SAW THE ALPS.**

CIRCLE 229 ON READER SERVICE CARD

ALQ300 is a trademark of ALPS Electric Co., Ltd. ©1986 ALPS America

# One Fast Son-Of-A-Pitch.



Face it. Speed talks. When running your business. And when running our Tri Printer.

It's called Tri Printer because it's three printers in one: providing data processing, true letter-quality word processing and high resolution graphics capabilities. All at a variety of character pitches and densities.

At 350 cps in data processing mode and 87 cps in letter quality mode, the Tri Printer is by far the fastest business printer in its class. Meaning that business conducted in the fast lane is finally supported by an equally fast printer.

In addition to its sheer speed, the Tri Printer's design surpasses the performance of printers that IBM, Apple and DEC make for their own computers. Improvements in important areas, like paper handling, font selection and quick-shift mode selection. And reliability.

Neither are there compatibility problems with your software. Because the Tri Printer emulates such popular printers as the Epson FX-100, IBM Graphics Printer, DEC LA210 and the Apple Imagewriter. Accomplished literally within seconds by merely changing personality cartridges.

Speed. It's still the acid test. For your business. And for our Tri Printer.

For more information on the Tri Printer, contact your distributor or CIE Terminals at 2505 McCabe Way, Irvine, CA 92714-6297; telephone (714) 660-1421 or (800) 624-2516.

**C.I.T.O.H**  
CIE Terminals

CIE Terminals, Inc., 2505 McCabe Way, Irvine, CA 92714 • Telephone: (714) 660-1421 (800) 624-2516

CIRCLE 349 ON READER SERVICE CARD

# ITT XTRA/286 ATW: 10-MHz AT Compatible with EGA for \$2,499



HANDS ON

BY WINN L. ROSCH

The XTRA/286 ATW (Advanced Technology Workstation) is obviously ITT's play for a larger share of the corporate computer dollar. Already offering an XT-compatible model, ITT completes its line of PCs with the high-performance XTRA/286 ATW.

Performance and sturdiness are the main extras that the XTRA/286 ATW delivers for a mere \$2,499, which includes ITT's EGA card. ITT is now a price/performance leader, approaching the \$2,295 price point set by the PC's Limited 286 10 (sans EGA).

On the other hand, the hard-disk-equipped XTRA/286 ATW, Model III, is a more dubious value. In this case, \$1,800 buys you a factory-installed 30-megabyte drive that would fetch about \$700 if bought separately.

An AT compatible, the XTRA/286 ATW's 10-MHz, one-wait-state 80286 microprocessor scores a speed rating of about 25 percent higher than the 8-MHz IBM PC AT and marginally faster than other 8-MHz machines with no wait

state. It also slows to 6 MHz for optimum compatibility.

The XTRA/286 ATW's only true design refinement is the opening of the bottom third of the drive bay so that three half-height devices can gain front-panel access. The standard internal full-height hard disk bay hides inside and immediately to the left of the open-front bay.

Physically, the XTRA/286 ATW is sturdily constructed and rigid, even when the top of the case is off. The disk drive bays are fully caged, open only in the front and rear. The drives mount with proprietary plastic guide rails that snap into place. Two extra pairs of rails are supplied. The hard disk drive is further secured by a retaining bracket that nearly covers its entire face.

Standard in all models of the XTRA/286 ATW is a 1.2-megabyte, half-height, high-density floppy disk drive (a Matsushita unit in the machine tested).

Unlike the IBM AT, the XTRA/286 ATW uses a Western Digital short-and-low hard disk controller. The floppy disk drive controller is built into the system board. All the necessary cables for adding a second floppy

disk drive and a hard disk are already installed.

As per the AT standard, the XTRA/286 ATW has two 8-bit and six 16-bit expansion slots.

Two banks of nine 256K-bit parity-checked DRAM (dynamic random access memory) chips are soldered to the system board, as are two banks of socketed 64K-bit DRAM chips that fill the XTRA out to the full 640K bytes. Optionally, 256K-bit chips can be substituted in the sockets to stretch total system board RAM to 1 megabyte.

A serial and a parallel port are also built into the system board; the port connectors are on a normal card-retaining bracket.

A clock/calendar and 64 bytes of CMOS memory, which stores system-configuration information, are kept alive when the power is turned off by a Ray-o-Vac lithium battery. Although ITT only specifies 192 watts of available power, the evaluation unit sported a 220-watt power supply.

The ITT keyboard follows the original 84-key AT design with the Esc and enlarged Enter and Shift keys at the right, above a combined numeric and cursor keypad. Its positive feel



FACT FILE

## XTRA/286 ATW

ITT Information Systems  
2350 Queme Dr.

San Jose, CA 95131

(800) 368-7300

(800) 321-7661 (in Calif.)

**List Price:** Model I (no hard disk), \$2,499; Model III (with a 30-Mbyte hard disk), \$4,299.

**Requires:** EGA, RGB, or monochrome monitor.

**In Short:** A high-performance (10-MHz) AT compatible with a built-in EGA and Hercules adapter. An excellent buy if purchased without the overpriced hard disk.

CIRCLE 429 ON READER SERVICE CARD

and subtle key click make it a real finger-pleaser.

Setup and operation of the XTRA/286 ATW is identical to the IBM AT. MS-DOS 3.1 and BASIC come with the machine, but the BASIC reference manual is a \$20 option. The ITT-copyrighted BIOS delivers full software compatibility.

With its 10-MHz speed and standard EGA adapter, the XTRA/286 ATW, Model I (the one without a hard disk), rates as an excellent buy—but get a hard disk from someone else. ☛



## Benchmark Tests: ITT XTRA/286 ATW vs. 8-MHz IBM PC AT

It's no surprise that ITT's XTRA/286 ATW beats the 8-MHz IBM PC AT in computing tests—ITT runs its processor nearly 25 percent faster than IBM. The hard disk bench-

mark tests support our conclusion that the XTRA/286 ATW is a great buy if you buy your hard disk elsewhere.

### Performance Times

(Times given in seconds except where noted)

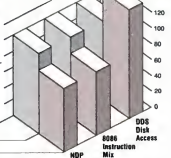
Product	NOP	8086 Instruction Mix	DOS Disk Access (milliseconds)
8-MHz IBM PC AT	4.17	8.96	42.88
ITT XTRA/286 ATW	3.35	7.19	58.80

The **NOP** benchmark test is designed to measure raw compute and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instruction in a big 128K loop.

The **8086 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

The **DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 3 and the interface factor is left at the driver's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.

### Relative Times (Ratio: 8-MHz IBM PC AT = 100)



## ■ NEW ON THE MARKET ■ JONATHAN K. MATZKIN

**Unison Technologies UPS: Power Supply and Power Director in Tiny \$495 Box**

The Unipower 400 from Unison Technologies combines a 400-watt uninterruptible power supply with an eight-peripheral power director in a \$495 package that sits between the CPU and the monitor.

The unit is designed to keep a system running without damage



or data loss during power failures, brownouts, spikes, and surges. Unison claims that the Unipower 400's batteries pro-

vide backup for up to 30 minutes at 200 watts and up to 15

minutes at 400 watts. Unison also says that its product offers true continuous protection by constantly synthesizing output. **List Price:** Unipower 400, \$495. Unison Technologies Inc., 23352 Madero, Suite H, Mission Viejo, CA 92691; (714) 855-8700.

**CIRCLE 443 ON READER SERVICE CARD**

**Datavue Technical Systems Super Micro/150 Features 10-mips Execution Rate**

The quest for ever higher processing speeds has produced either a clear front-runner or an interesting novelty.

Datavue Technical Systems says that its Super Micro/150 CPU operates at a peak execution rate of 22 million instructions per second (mips) and at an effective rate of 10 mips. Datavue says that this speed is equivalent to an Intel 8086 microprocessor running at a clock rate of 150 MHz.

This is accomplished using proprietary "Flow Through Logic" architecture and the Datavue Technical Systems R6150 CPU.

Datavue claims that the Super Micro/150 maintains full compatibility with the 8086 microprocessor instruction set and with most popular software.

Super Micro/150 is available as a board set, as a system box, or as a fully configured system. The basic system (Model 180BB-1) costs \$12,690 and includes the Super Micro/150 system box and an IBM PC AT-style I/O processing chassis, which contains a Datavue 8612 CPU with 512K RAM. Also included are an enhanced I/O and memory expander option, an AT-style keyboard, up to nine expansion slots, and a 190-watt power supply.

**List Price:** Super Micro/150, Model 180BB-1, \$12,690. Datavue Technical Systems, 4355 International Blvd., P.O. Box 2687, Norcross, GA 30093; (404) 564-5780.

**CIRCLE 440 ON READER SERVICE CARD**

## HOT PROSPECT

**Borland's Turbo BASIC Package Provides Structured Programming**

Borland International has combined quick-and-dirty BASIC with the structured approach of Pascal and has added in an interactive editor/compiler like Turbo Pascal's. Listing for \$99.95, Turbo BASIC supports block structured programming statements, true recursion, and access to all of the computer's memory. Full 8087/80287 math coprocessor support is also provided, and Borland says benchmark tests show Turbo BASIC to be the fastest commercially available PC BASIC compiler.

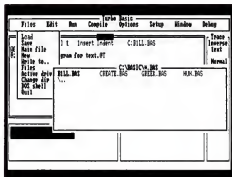
Turbo BASIC's Turbo Pascal-like interactive programming environment features pull-down menus, con-

text-sensitive help, and windows for editing, messages, tracing, and program execution.

The Turbo BASIC package includes a memory-to-memory compiler, an internal linker and run-time library, a full-screen editor, source code, and the Microcalc spreadsheet program. It is compatible with IBM's BASIC and Microsoft's GW-BASIC and supports EGA graphics.

**List Price:** Turbo BASIC, \$99.95. **Requires:** 256K RAM. Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066; (408) 438-8400.

**CIRCLE 438 ON READER SERVICE CARD**



The user interface of Borland's Turbo BASIC will be familiar to users of Borland's other programs. The \$99.95 programming language has windows for editing, messages, tracing, and program execution.

**Computer Peripherals' EGA-Compatible Board Uses A Single Gate-Array Chip**

The Graphmaster EGA graphics card, \$545 from Computer Peripherals, runs monochrome, EGA, and CGA adapter software. The board uses a single custom gate-array chip to lower cost and increase dependability, according to Computer Peripherals.

Maximum resolution is 720 by 350 pixels, and a switch selects the appropriate resolution for each graphics mode. Software makes it possible for the user to reconfigure the card from the keyboard.

**List Price:** Graphmaster, \$545. **Requires:** 256K RAM. Computer Peripherals Inc., 2635 Lavery Ct., #5, Newbury Park, CA 91320; (800) 854-7600.

**CIRCLE 444 ON READER SERVICE CARD**

**Terrific! Chart Maker Keeps a Diagram Visible While It Is Constructed**

Terrific!, an organization chart maker, gives the user complete visual access to the chart at all times during use of the program. The \$24.95 interactive chart editor from KD Systems assists with tasks such as drawing boxes, justifying text, and moving parts of the diagram.

**List Price:** Terrific!, \$24.95. **Requires:** 192K RAM. KD Systems Inc., P.O. Box 2476, Northbrook, IL 60065; (312) 541-8719.

**CIRCLE 445 ON READER SERVICE CARD**



## Kaypro, Zenith Data Systems Join the Early Race for 80386 Supremacy

While the world waits for IBM to make its move, Big Blue's competitors are wasting no time following Compaq into the 80386 marketplace.

**Kaypro Corp.'s** basic 80386 system, the \$4,995 Model A, includes a 1.2-megabyte floppy disk drive, 512K RAM, and a floppy and hard disk drive controller board. The \$6,295 Model E, intended for power users, adds a 40-megabyte hard disk drive and comes with 1 megabyte of RAM. The Model N Network File Server is available with a 170- (\$11,450), 280- (\$14,950), or 380- (\$19,950) megabyte ESDI hard disk drive. All three systems are expandable up to 660 mega-

bytes of hard disk storage and 16 megabytes of RAM and are available with monochrome, CGA, or EGA video displays.

**Zenith Data Systems** will market two versions of its Z-386. The Model 40, at \$6,499, features a 40-megabyte hard disk drive, a 1.2-megabyte floppy disk drive, and six open expansion slots. The Model 80 includes an 80-megabyte hard drive and costs \$7,499. Both models feature 1 megabyte of on-board RAM, expandable to 16 megabytes. An optional cache controller board stores data in fast static RAM.

**List Price:** Kaypro Model A, \$4,995; Model E, \$6,295; Model N Network File Server with 170-

*Zenith's Z-386 Model 40 has a 40-Mbyte hard drive, 1 Mbyte of RAM, and a 1.2-Mbyte floppy disk drive. An optional cache controller board is available.*



Mbyte drive, \$11,450; with 280-Mbyte drive, \$14,950; with 380-Mbyte drive, \$19,950. Kaypro Corp., P.O. Box N, Del Mar, CA 92014; (619) 481-4300.

CIRCLE 436 ON READER SERVICE CARD

**List Price:** Zenith Z-386, Model 40, \$6,499; Model 80, \$7,499. Zenith Data Systems, 1000 Milwaukee Ave., Glenview, IL 60025; (312) 391-8860.

CIRCLE 437 ON READER SERVICE CARD

## 4375 Ultrascan Represents Thomson in Multiscanning Monitor Competition

The 4375 Ultrascan monitor, with an \$895 price tag from **Thomson Consumer Products**, is the latest entry into the market defined by NEC's MultiSync Monitor. Automatically adjusting to any horizontal scan frequency between 17.7 and 35 kHz and to any vertical scan frequency between 45 and

75 Hz, the Ultrascan operates transparently with most PC color/graphics cards. The Ultrascan also automatically supports the IBM monochrome and Hercules standards.

**List Price:** 4375 Ultrascan, \$895. Thomson Consumer Products Corp., 5731 W. Slauson Ave., #111, Culver City, CA 90230; (800) 325-0464.

CIRCLE 441 ON READER SERVICE CARD



*Thomson Consumer Products Corp.'s 4375 Ultrascan monitor lists for \$895 and adjusts to horizontal scan frequencies between 17.7 and 35 kHz; and vertical scan frequencies between 45 and 75 Hz.*

## Epson, Houston Instrument Debut Image Scanners as Printer, Plotter Options

Two companies have introduced image scanners that work in conjunction with products that users may already own.

At the low end of the price scale sits **Epson America's** \$299.95 Image Scanner Option Kit, an accessory for its EX-800, EX-1000, and LQ-2500 dot matrix printers. The device consists only of the scanning "eye," which installs in the printhead carriage after removing the ribbon cartridge and uses the carriage to scan hard-copy images. It has resolutions of 180 by 180 dots per inch on the LQ-2500 and 144 by 144 dpi on the EX series printers, and it comes with an identity cartridge, a disk containing Epson's scanner utility, and *Insert* software.

**Houston Instrument's** \$2,995 Scan-Cad Accessory attaches to its DMP-50 series of pen plotters. The 200-dpi scan head can accurately detect lines as fine as .007 inch and can scan drawings from paper, vellum, acetate film, or blue-line. Scan-Cad comes with a snap-on head, a cable and cable-support assembly, a controller expansion card, scanning software, and a document carrier.



*Epson's Image Scanner Option works with three of Epson's dot matrix printers.*

**List Price:** Image Scanner Option Kit, \$299.95. **Requires:** 384K RAM for 640 by 200 resolution; CGA, EGA, or Hercules display adapter or compatible. **Epson America Inc.**, 2780 Lomita Blvd., Torrance, CA 90505; (800) 421-5426.

CIRCLE 438 ON READER SERVICE CARD

**List Price:** Scan-Cad Accessory, \$2,995. **Requires:** 640K RAM, 10-Mbyte hard disk, and Houston Instrument DMP-50 series drafting plotter. **Houston Instrument**, 8500 Cameron Rd., Austin, TX 78753; (800) 531-5205.

CIRCLE 439 ON READER SERVICE CARD

## ■ QUICK LOOKS

## Map Software: To Live and Drive in L.A.

### HANDS ON

BY JONATHAN K. MATZKIN

Let's say you're visiting Los Angeles and you want to find a good restaurant, fast. Pull out your laptop PC, boot Klynas Engineering's *Streets on a Disk*, and select an entry; the program will soon have detailed directions to a restaurant of your choice.

*Streets on a Disk*, which runs on any CGA-compatible PC, generates travel directions and calculates approximate time, distance, and fuel requirements.

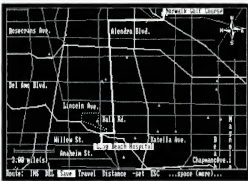
Unfortunately, the program's data files now cover only the streets of L.A., though more cities are promised. If the program goes into the same depth of detail on other cities as it does on L.A., *Streets on a*

*Disk* could turn out to be a valuable tool for travelers. Right now, it's really only a guide to L.A.—or a great toy for anyone with a touch of wanderlust.

For \$49.95, you get a U.S.

road map that covers only a portion of the interstate highway system. For another \$20, L.A. maps are included. Extra maps can be entered with a mouse.

When you call up a place



The triangles on the *Streets on a Disk* display are locations stored in the database; the program shows the best route and distance between two points.

from the menu, borders and streets fill the display. You can outline a section of the city to a street or location and select the Identify option from the menu; the street or location name will appear. An expandable note file is attached to each location so that you can store comments.

The L.A. map includes databases of local hotels, restaurants, airports, and other points of interest.

It may not be the most useful program ever written for the PC, but it's a fun way to visit L.A. without leaving your desk, for sure.

**List Price:** *Streets on a Disk*, \$49.95 with U.S. map; \$69.95 with U.S. and L.A. maps. **Requires:** 320K RAM, CGA adapter, DOS 2.0 or later. Klynas Engineering, P.O. Box 1666, Simi Valley, CA 93062; (805) 583-1029.

CIRCLE 428 ON READER SERVICE CARD

## PC Mouse Bus Plus: A Port Saver

### HANDS ON

BY BILL MACHROME

The latest incarnation of the PC Mouse is better than ever. I had preferred its optical technology to the more common roller because the mild friction allowed me to be more accurate. But I stopped using the PC Mouse because it used up one of my precious serial ports.

Now I can revert. Mouse Systems Corp.'s PC Mouse Bus Plus version comes with a half-length card that can be COM1, COM2, or a parallel interface on your system. In its parallel mode, it can be set to use the PC AT's underutilized extended interrupt lines, so it doesn't conflict with existing hardware. It also dispenses with the messy external power supply and transfer box of the old mouse.

The software is simple and flexible. It uses either a driver that goes into CONFIG.SYS or a .COM program if you use the mouse only occasionally. The

*Designer Pop-Up Menus* compiler allows you to build mouse-driven interfaces to virtually any popular software package and comes with half a dozen preconfigured.

The PC Mouse also comes with *PC Paint*, one of the origi-

nal color-paint programs. It's been updated to run with 16 colors and the EGA.

I tested the Bus Plus card in an IBM PC AT, a Compaq Plus, and a 16-MHz PC's Limited, with *Microsoft Windows*, *Microsoft Word*, 1-2-3, and *Word*.

*Star*. It's been a pleasure.

**List Price:** PC Mouse Bus Plus (Software Version 5.01), \$199; utilities upgrade, \$25; *PC Paint* upgrade, \$34.95. **Requires:** Expansion slot. Mouse Systems Corp., 2600 San Tomas Expy., Santa Clara, CA 95051; (408) 988-0211.

CIRCLE 429 ON READER SERVICE CARD

## dBASE on Video: A Basic Primer

### HANDS ON

BY MITT JONES

Whether it's lack of time or lack of courage that's kept your office from delving into the exhaustive *dBASE III Plus* manual, the *dBASE III Plus Learning System* video tutorial may be the cure.

Geared toward the corporate environment, the 2-hour VHS videocassette covers the basics of interactive *dBASE III Plus*, beginning with introductory database concepts and ending with report and label generation.

The video, codeveloped by MicroTrek Enterprises and MicroVideo Learning Systems, is paced about right for following along at a PC, and clear screenshots allow you to compare displays.

Viewers who resist the instructor's occasional advice to stop the video and complete the workbook exercises will be cheating themselves of much of the *Learning System's* value. While the video concentrates primarily on *dBASE III Plus's* menu-driven assistant mode, additional exercises in the workbook begin the transition

to command mode.

It's difficult to find flaw with the *Learning System* and even more difficult to imagine a quicker, more pleasant way to learn the basics of *dBASE III Plus*.

**List Price:** *dBASE III Plus Learning System*, \$495; additional workbooks, \$39.95 each or \$395 for 10. **Requires:** VHS-format VCR, monitor. A PC running *dBASE III Plus* is recommended. MicroTrek Enterprises, 518 Fifth Ave., New York, NY 10036; (212) 398-6410.

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A full range of low cost options includes external 5.25-inch, 360 KB and 3.5-inch, 720 KB floppy disk drives; 300 baud modem; MS DOS 2.1 and GW BASIC; and handsome carrying case.

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**\$1499.**

LAP/PRO 10 is truly a computer for all seasons. Unplug it at your office, pop it into its handsome fabric-and-leather

carrying case, and take it in the car, on a plane, anywhere your data needs to go. Ready to operate in seconds.

This full-featured, high-power system is far superior to the IBM® Lap Top. The standard, AC-powered model gives you an advanced, 16-bit 80186 CPU; 640 KB of main memory; dual 5.25-inch, 360 KB floppy disks; 96-pin expansion port; serial and parallel communication ports; and a high-contrast, 80x25 back-lit LCD display with 640x200 pixel resolution. A 300/1200 baud modem, MS DOS 2.1®, and carrying case are optional.



Fullly IBM-compatible, LAP/PRO 10 handles MS-DOS® in its various versions, as well as a full range of IBM application software. The enhanced keyboard is IBM PC®-compatible, too,

with 83 keys, including 10 function keys, cursor keys, and a 10-key numeric pad!

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CIRCLE 507 ON READER SERVICE CARD

# A Communications Classic in The Making: ProComm 2.4.2

## PC HANDS ON

BY GUS VENDITTO

From the ether world of PC bulletin boards—where trends change faster than the 10 or 20 redials it takes to log on—comes *ProComm*, a contender for the throne that *PC-Talk III* has held as the queen of the shareware communications programs.

It's hard to imagine software better designed for easing communications chores. File transfers using ASCII, Xmodem, Ymodem, Kermit, or CompuServe's B protocol require all of four keystrokes. Line setting changes are an Alt-P combination away. And an intelligently designed script language can automate most every task, without making you learn a new programming language.

Totally menu driven, *ProComm* makes simple communications chores downright easy and fun. Windows zoom in and out like busboys in a cafe; electronic "woosh" sound effects can heighten the excitement if you choose, but like most *Pro-*

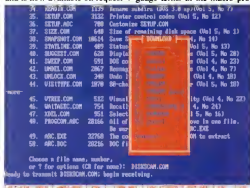
*Comm* functions, the sound effects and zooming windows can be tailored to your taste.

Because *ProComm* shares many command key combinations with *PC-Talk* (a coincidence *ProComm*'s makers say is unintentional), *PC-Talkers* can switch to *ProComm* with virtually no learning curve. (A utility that converts *PC-Talk* directories to *ProComm*'s format was available in early versions and is now available on request

from the manufacturer.)

Each new release has refined the program, without expecting you to change. In its latest incarnation, *ProComm*'s status line was enhanced to report on terminal mode (ten, including the Wyse 100, the IBM 3101, and the VT-100 and -52, are available), line setting, duplex mode, and printer activity.

The most welcome improvement is the use of English-language terms in the macro pro-



*ProComm*'s menu structure, governing everything from file transfer to macro creation, keeps the active terminal screen free of local keyboard input.

## PC FACT FILE

*ProComm*, Version 2.4.2  
Datastorm Technologies Inc.  
P.O. Box 1471  
Columbia, MO 65202  
(314) 449-7012  
List Price: \$50; \$35 for a disk that includes the manual on a disk file; \$25 registration fee for shareware users.  
Requires: 130K RAM, DOS 2.0 or later.  
In Short: A perfect gem of a communications program. Not copy protected.

CIRCLE 433 ON READER SERVICE CARD

cessor; Transmit replaces %T, for example. A utility for converting old command sequences is included with new versions.

The trick that really turns the tide in *ProComm*'s favor over other low-cost communications programs is remote access capability. It's a crude but effective way to get a look at the files on a remote *PC*; *ProComm* will auto-answer and then turn the answering *PC* over to DOS by redirecting console I/O out the COM port.

For \$50, *ProComm* is a classic case of software growing to meet its users' needs.

# WordPerfect 4.2 Improves Indexing; Adds Document Preview, Hidden Notes

## PC HANDS ON

BY MITT JONES

None of the 30 or so enhancements to *WordPerfect* in Version 4.2 are liable to make your skin tingle, but most are welcome improvements.

A new concordance feature allows you to store words and phrases for automatic indexing in a separate file. Rather than search through a document marking text to be indexed, you simply designate a concordance file, enter the words or phrases to be indexed, and specify in-

dexing instructions.

A new editing feature allows comments and a summary to be embedded in documents and displayed or suppressed at will. When displayed, the notes are enclosed in a box and cannot be edited from the document.

PostScript printer support also makes its debut in Version 4.2, as does a preview feature, which displays documents as they will appear when printed.

Other Version 4.2 enhancements include an on-line tutorial, the ability to define 24 text columns across the page, document-name display in the lower-

left-hand corner of the screen, and the ability to search headers, footers, and footnotes along with a document.

Some Version 4.2 menu changes may affect 4.1 macros. One such change involves *WordPerfect*'s List Files screen—depressing the Enter key no longer returns the program to the open document.

Version 5.0 will probably hit the market near the end of 1987 and will contain some desktop publishing features. Until then, owners of earlier *WordPerfect* versions can probably live without the latest enhancements.

## PC FACT FILE

*WordPerfect*, Version 4.2  
*WordPerfect* Corp.  
288 W. Center St.  
Orem, UT 84057  
(801) 225-5000  
List Price: \$495; upgrade for registered owners of Version 4.1, \$30; upgrade for registered owners of 4.0 and earlier, \$65.  
Requires: 256K RAM, two disk drives, DOS 2.0 or later.  
In Short: Version 4.2 enhances an already feature-packed, professional-quality word processor with annotation capabilities and PostScript support. Not copy protected.

CIRCLE 424 ON READER SERVICE CARD

# Our Latest Business Reply.

At WordPerfect Corporation, the one thing we do best is listen. When users asked for a powerful word processor, we listened—and gave them WordPerfect. When they told us how we could make it better, we listened—and came back with a better WordPerfect.

Lately, we've been hearing from a lot of corporate WordPerfect users, and we've been listening. The result is WordPerfect 4.2.

## **Better business.**

WordPerfect 4.2 incorporates several new features into WordPerfect word processing to make life in the business world easier.

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Document preview allows you to view your finished document—showing justification, headers and footers, footnotes, etc.—before you print. And a document summary can be created and saved to record a document description, creation date, author and typist.

## **Legal aid.**

Some of the new business features in WordPerfect 4.2 are specifically designed for easier handling of legal documents. References within a document can now be marked to allow automatic generation of a table of authorities. And line numbers can be designated and printed in the left margin.

Other new features include an on-line tutorial for easy learning, an expanded thesaurus with over 10,000 headwords, concordance capability, non-sequential page printing, and a new Post Script printer driver that supports all of WordPerfect's current capabilities.

## **Made to order.**

Give your business the benefit of a word processor that responds to corporate needs. Get WordPerfect 4.2—the perfect tool for better business.

For more information, call or write WordPerfect Corporation, 288 West Center St., Orem, Utah 84057 (801) 227-4000.

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Today's 386 compatibles  
fall into two categories:

Those that "enhance" technology.

And those that blow it away.



The PC Designs GV-386 is not an enhancement. It's the fastest 80386-based compatible you can buy.

That's because the engineers here at PC Designs realized early on that to take full advantage of the 80386 chip, an equally revolutionary motherboard was needed.

So they started with a blank piece of paper and—from the ground up—designed a 80386 micro that blows the doors off every other compatible available.

#### Get Power Hungry

At the heart of the GV-386 is a 32-bit processor operating at 16MHz clock speed; keyboard switchable to 8MHz (it will even support 24MHz operation, once Intel makes that available).

And that's Zero Wait State clock speed, thanks to a specially-designed, high-speed memory cache circuit. When enabled, this unique circuit—with a full 64K of static RAM—allows you virtually instant data retrieval 80 percent of the time.

The cache circuit—a PC Designs exclusive—also ensures rock-solid reliability because it eases the load high speed puts on the integrated circuits. Even at zero wait state, the GV-386 never exceeds IC design specifications.

#### Radical, but compatible

Despite its radical innovations, the GV-386 was designed to retain the standard 8MHz IBM PC-AT bus timing. The result is unparalleled compatibility with existing software and hardware.

And every GV-386 is bundled with Desqview 1.3 from Quarterdeck Office Systems, giving you both expanded memory management and multitasking capabilities allowing up to nine simultaneous operations.

#### Affordable power

If all this speed and performance doesn't blow you away, take a look at the price: The standard system starts at around \$4000. And it's available now.

The fact is, it's the most innovative compatible to date. So why settle for an 80386 machine that just "advances" technology, when the GV-386 blows it away?

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# Tandy 1000SX: A Slight Improvement

## PC HANDS ON

BY PAUL M. STAFFORD

The only distinction between Tandy's new 1000SX and the plain old 1000 is an 8088-2 microprocessor that speeds operations so little you'll barely notice the difference.

Otherwise, the two machines are identical. Electronics for a CGA-compatible graphics adapter, a light pen and two joystick interfaces, a dual floppy controller, and a printer port are still mounted on the system board. Ports peek out the front and back of the case. Still, only 3/4-length cards fit into the five expansion slots. With the availability of shorter add-on boards, this is not nearly the hardship it once was and is an arguable trade-off for the 1000's small (16 1/2- by 13 1/2-inch) footprint.

Unfortunately, Tandy failed to take the opportunity with this upgrade to fix the 1000's ridiculous keyboard. While it gives better tactile feedback than the standard clone fare and has a separate set of cursor keys and LEDs for CapsLock and NumLock, its layout is busy and confusing. Alt, PrtSc, Backspace, NumLock, Home, and the cursor keys all occupy the vertical space between the alphabet keys and the numeric keypad (which doubles as an alternate set of

cursor keys for some, but not all, software). CapsLock is in the lower-left-hand corner—too close to the Left Shift key.

Tandy's RGB display could also have undergone improvement. Its bright, accurate colors make for good games and color graphics; its text resolution makes for a serious case of eyestrain. The pixels on the Tandy display are significantly larger and somewhat fuzzier than those on the IBM Color Display, so colors appear brighter and characters appear grainier.

(continues on page 54)



Tandy's 1000SX is solidly made, but marred by a poor keyboard.

## PC FACT FILE

### Tandy 1000SX

Tandy/Radio Shack  
1700 One Tandy Center  
Fort Worth, TX 76102  
(817) 390-3300

List Price: \$1,199; RGB monitor, \$299.95.

Requires: A monitor.

In Short: Still one of the best companies you can buy, but the computer could stand improvement.

CIRCLE 425 ON READER SERVICE CARD

# Victor Champion: Well-Built Bargain

## PC HANDS ON

BY PAUL M. STAFFORD

The latest offering from Victor Technologies is probably the best home-market PC compatible \$799 can buy.

This 8086-2-based machine has its share of quirks—like nonstandard 16-bit bus slots and a dual floppy disk controller that has only an edge connector for one drive—but for the money, you get a lot of computer.

Start with the 8086-2 running at 4.77 MHz: in real-life tests, it's only slightly faster than a 4.77-MHz 8088 but faster none-

theless. The motherboard holds 640K bytes of RAM, as well as the floppy disk controller and a parallel and a serial port.

The Champion has two half-height disk drive bays and five expansion slots. Two slots are weird 16-bit jobs, which also accommodate standard 8-bit edge connectors. With most necessities on-board, once you add a video controller and maybe a hardcard, you've got three slots free for exotica.

The monochrome monitor Victor sent along for review is a \$119 option. Text quality is excellent when you hook it up to

(continues on page 54)



Victor's \$799 Champion is a bargain for the businessman who needs to extend his workday at home.



## Benchmark Tests: Tandy 1000SX and Victor Champion vs. IBM PC-XT

The Victor Champion's 8086-2 microprocessor gives it an edge over the IBM PC-XT, but because the Tandy runs its 8088-2 microprocessor at 7.16 MHz, the two challenge each other.

### Performance Times

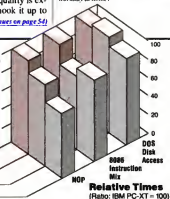
(Times given in seconds except where noted)

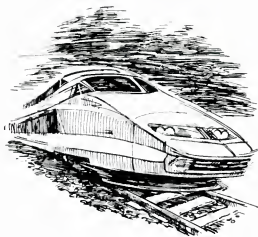
Product	NOP	8086 Instruction Mix	DOS Disk Access (milliseconds)
IBM PC-XT	10.14	32.02	234.70
Tandy 1000SX	8.90	25.32	242.50
Victor Champion	7.03	28.13	219.32

The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instruction in a big 128K loop.

The **8086 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

The **DOS Disk Access** benchmark test measures the time it takes to do a random sector read using DOS. DOS buffers are set at 1 and the interruptive factor is left at the driver's default setting. This test adds DOS's overhead to the BIOS and hardware times. The test program performs the sector read 1,000 times within the DOS disk partition. The average result is shown in milliseconds.





## How a French train inspired the fastest 286 micro you can buy.



Not just any French train, but "La Grande Vitesse"—"The High Speed." It's the fastest train in the world, routinely eating up steel track at speeds normally associated with small aircraft.

It was during such a screaming run between Paris and Nice that we christened our new, high-speed micro... a superfast 12MHz 386 microprocessor operating at Zero Wait State.

### Enter the No-Wait-State

We call this remarkable compatible the "GV" 286, named for the other revolutionary speedster that inspired it. It's the very first 12MHz No-Wait-State micro available outside a research laboratory.

To design a machine that operates reliably at 12MHz with no wait states, our engineers had to come up with some major innovations. And they did.

### A power user's dream

The GV-286 is the first 80286 micro to include a high-speed RAM cache circuit, making data retrieval from the processor almost instantaneous. It's the same design feature that makes our new GV-386 the fastest machine in that rarified category.

The cache circuit also assures high reliability, allowing the GV-286 to operate at super-high speeds without pushing its integrated circuits beyond their design limits. Other 12MHz machines put their ICs through hell to achieve high speed, and that means they're inherently less reliable.

Yet with all this speed and design innovation, PC Designs engineers—unlike other manufacturers—have customized the BIOS and retained the standard IBM PC-AT bus timing (yet another PC Designs exclusive). That means unparalleled compatibility with existing software and peripherals.

### Stop waiting

There's a boxcar load of other design features and the GV-286 can be ordered up in virtually any configuration you can imagine. Best of all, standard systems start at less than \$4000 (including Desquing multi-tasking software).

If you've been holding out for a 80286 micro with the speed of a bullet train and the reliability of the family station wagon, your wait state is over.

# PC Designs

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## ■ COMMUNIQUE ■ EDITED BY BILL HOWARD

## John Dvorak's Favorite Comdex Parties

Inventive partygoer and contributing editor John C. Dvorak rates the top parties at Comdex/Fall '86 in Las Vegas, including his own:

"Too many Comdex parties were the same old hotel fare served in boring ballrooms with no place to sit. Again too many parties allowed showgoers to risk digestive failure by serving steak tartare, an inexcusable thing to do on a road show.

**Best food.** Silicon Northwest reception. The Pacific Coasters brought their rare little oysters and unusual fishes to be eaten by throngs of reporters (most of whom would eat anything). There were also a few remarkable Chardonnays from Washington State. The Spanish

Trail Country Club was an elegant, uncrowded setting—uncrowded in part because overzealous security guards tried to turn away invited guests (with invitations in hand) if the guests didn't also have Comdex press ribbons.

**Most crowded.** My party, cosponsored by the Lotus consortium, was the most jammed. We took over Play It Again Sam and had a huge tent outside, complete with disco deejays and scantily clad women. Despite the huge square footage (not to mention some square attendees), the party spilled over into the street.

**Most lavish.** The PC Magazine Awards for Technical Excellence ceremony."

Heard or seen anything offbeat, unusual, or just plain dumb about the computer industry? Send your offerings to *Communique*, PC Magazine, One Park Avenue, New York, NY 10016, (212) 503-5293 or MCI Mail 157-9301.

Contributors receive \$50 and a PC Magazine T-shirt. Contributor for this issue: Stephen Manes (*Chinese Recipes*).

## Tandy

(continued from page 52)

So what we have is the same old machine, only a bit faster. How much faster? Not much. PC Labs benchmark tests (see graph) that run in about 10 seconds on an IBM PC take about 7.5 to 8.5 seconds in the 1000SX's 7.16-MHz fast

mode. Switching speeds is easy—through an F4 toggle or a Mode command—but I doubt many applications will choke on the top speed, so there's little reason to ever switch.

Tandy has also taken the liberty of supplying software with the new unit. Aside from MS-DOS 3.2 and GW-BASIC, you also get a beginner's integrated

## It Runs Under MSG-DOS



Spotted at Comdex/Fall '86: The Beijing-Guangdong Chinese Computer Center's "Awakened Lion Brand" PC clone, sporting 256K bytes of Chinese-character ROM and such specialized programs as *Software System for Chinese Medical Therapy*, covering both acupuncture and moxibustion, and *Chinese Recipes*.

*Chinese Recipes*, written in a Chinese-English version of dBASE III, includes such perennial favorites as West Lake Black Mushroom Potage, Curry Shallow-Fried Pork Chops, and Smoked Pomfret. From the descriptive literature (reprinted verbatim):

"China is the oldest civilized country with long history. During the period long living Chinese have created more than five thousand the best materials, elaborate work, rich and colorful dishes and high cook skills. Chinese diet ranks first in the world.

The Chinese food is particularly about five words: Colour, smell, taste, form and ware. The bright coloured dishes give you an appetite.

Compared with foreign food, the smell of Chinese food is unparalleled. When the dish is approaching a dining table, its nice smell surely makes your saliva out. As for taste, it is unique throughout the world. So, every dish with four characteristics: Colour, smell, taste and form placed in the super-elegant chinaware is like the red flower in the green leaves and the beauty wearing fine clothes and ornaments.

All these features make Chinese food luxurious out of the ordinary."

Forget the smell. The ware alone made our saliva out.

## Victor

(continued from page 52)

the standard ATD (Zuckerboard) Monochrome Plus Hercules clone (Victor is planning to offer a different video board in the future). The keyboard far surpasses most cloneware, including the one with Tandy's 1000SX.

As with the 1000SX, software is also included: the *Calc-Result* spreadsheet and the *WordResult* word processor.

Perhaps this is the machine Tandy should have made. But who ever heard of Victor? ☐

## PC FACT FILE

**Victor Champion**  
Victor Technologies Inc.  
380 El Pueblo Rd.  
Scotts Valley, CA 95066  
(408) 438-6680

**List Price:** \$799; monochrome monitor, \$119.

**Requires:** A monitor.

**In Short:** For once, \$799 buys a real bargain—a well-built PC with plenty of features.

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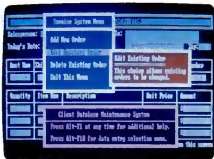
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— Gary N. Prague, Author, "The dBase III Programming Handbook"

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## ■ PC UPDATE ■ PEGGY GAVAN

IBM Corp. is shipping a patch disk for DOS 3.2 that includes five amended DOS command files—BASIC, BASICA, COMMAND.COM, DISKCOPY, and XCOPY—and two keyboard programs for the IBM Enhanced Keyboard (KEYBUS.COM and KBSEL.COM). The DISKCOPY utility corrects the inability of the 1.2-megabyte drive in the IBM PC-XT Model 286 to format 360K-byte disks; the BASIC patch files correct errors encountered using cursor keys in BASIC's edit mode. Registered owners of DOS 3.2 can obtain a free patch disk from dealers or IBM direct-sales representatives. The disk will also be included with new copies of DOS 3.2 at no extra charge.

TDA has released a new line of keyboard templates for use with the IBM PC Enhanced Keyboard. The new E Version folds in half, decreasing the total length from 18½ inches to 9½ inches. Prices for



TDA's E Version line of keyboard templates is designed to support the IBM PC Enhanced Keyboard and folds to the size of most software documentation.

the templates range from \$19.95 for *WordStar* and *Turbo Pascal*, \$22.95 for *1-2-3*, and \$24.95 for *Symphony* and *dBASE*. TDA, Herndon, Va.; (703) 437-4148.

Autodesk has removed the hardware copy-protection device from *AutoCAD*, Version 2.5. Upgrades to the non-copy-protected Version 2.52 are free of charge to registered users who had bought Version 2.5 with the hardware lock. Autodesk, Sausalito, Calif.; (415) 332-2344.

Enhanced features of the Hayes internal *Smartmodem 2400B* and external *Smartmodem 2400* include increased storage capacity for up to four 36-character phone numbers and Hayes AutoSync capability in the external version. With Hayes AutoSync capability, users of the 2400 no longer need a separate synchronous communications card to have synchronous communications capability. The 2400 and the 2400B retail for \$899 and \$739, respectively. Hayes Microcomputer Products, Atlanta, Ga.; (404) 449-8791.

*Desqview*, Version 2, incorporates all the features of IBM's *TopView* operating environment and supports *TopView's* .PIF format. Users can now run up to 256 programs simultaneously instead of the nine maximum supported in the earlier versions. Upgrades are \$30 for users of Version 1.3 and \$50 for users of earlier versions. Quarterdeck Office Systems, Santa Monica, Calif.; (800) 845-6621; (213) 392-9851.

Quadram Corp. is offering users the opportunity to trade in, with a \$395 payment, their *Quadram Multifunction Board* for the 1-megabyte *QuadEMS Plus I/O Multifunction Board*. The *QuadEMS Plus I/O*, usually priced at \$795, is equipped with parallel and

serial ports and a real-time clock/calendar with battery backup. Quadram Corp., Norcross, Ga.; (404) 923-6666.

*Boeing CALC*, Version 3.01M, is configured for use in a local area network (LAN) with up to eight users. The LAN version gives users simultaneous access to different ranges of cells in the same file and also provides cell-level security. A single copy of Version 3.01M sells for \$795; the standalone version is priced at \$399. Users can upgrade for \$396, the difference between the two versions. Boeing Computer Services, Seattle, Wash.; (800) 551-0800.

Office Solutions has altered the Wang word processor-like appearance of *OfficeWriter* by adding a number of features, including a 40,000-word thesaurus, multiple-column capabilities, and a document-search facility. *OfficeWriter* lists for \$495, and upgrades are \$75 for registered owners. Office Solutions, Madison, Wis.; (608) 274-5047.

The entire line of Summagraphics Corp.'s MM graphics tablets supports *Microsoft Windows* using a new software driver available free through Microsoft dealers. The support adds several new features, including scaling on input and interchangeable use of the tablet's stylus or cursor. Prices for the tablets are \$395 for the 6-by-9-inch version, \$595 for the 12-by-12-inch, and \$995 for the 18-by-12-inch. Summagraphics Corp., Fairfield, Conn.; (203) 384-1344.

*Show Partner*, Version 2.0, now runs on IBM's EGA, CGA, and the Hercules Monochrome Adapter without modification and has a new feature to instantly change the color of an object during presentations. *Show Partner* is available as a standalone program for \$79 or can be bought bundled with the *Microsoft Mouse*. Upgrades are \$30 for registered users. In addition, The Marketing Channel is now offering the *PicturePak* clip-art product as a new add-on module for *Show Partner*. Upgrades to *Show Partner*, Version 2.0, are reduced to \$15 with the purchase of the \$129 module. Brightbill-Roberts/The Marketing Channel and Co., Syracuse, N.Y.; (315) 474-3400.

In brief: *R:base System V* is now available in a 3½-inch disk format. Registered users of the 5¼-inch version can upgrade through February 28 for \$50, and users of *R:base 5000* can upgrade for \$99 until January 31. For additional upgrade information call Micromir at (206) 248-2001...SoftLogic Solutions has removed copy protection and added several new features to its *Disk Optimizer*, *DoubleDOS*, and *Software Carousel*. Upgrades are \$15, plus \$2.50 shipping and handling. SoftLogic Solutions, Manchester, N.H.; (603) 622-6956...Intex Solutions has removed copy protection from its entire line of XYZ products, *XYZ:Consolidate*, *XYZ:Spread*, and *XYZ:Query*. Non-copy-protected disks are available to registered users for \$20 per disk plus shipping. Intex Solutions, Wellesley, Mass.; (617) 431-1063...DecisionWare has released *RightWords*, a \$29.95 utility package for its *RightWriter*-style spelling checker that allows users to add words to the *RightWriter* dictionary and label them as common, slang, or buzz. DecisionWare, Sarasota, Fla.; (813) 952-9211...Software Products International has released *Open Access II Network*, a modular software package designed to run on Novell's NetWare, IBM's PC Network, 3Com's 3 Plus, and the Ungermann-Bass network operating systems. SPI, San Diego, Calif.; (619) 450-1526...CMS is offering \$200 off its K-Kit 60, a new 60-megabyte hard disk drive subsystem, to owners of the IBM PC-XT Model 286 who trade in their IBM 20-megabyte full-height disk drives. The swap-up program ends January 31. CMS, Costa Mesa, Calif.; (714) 549-9111.

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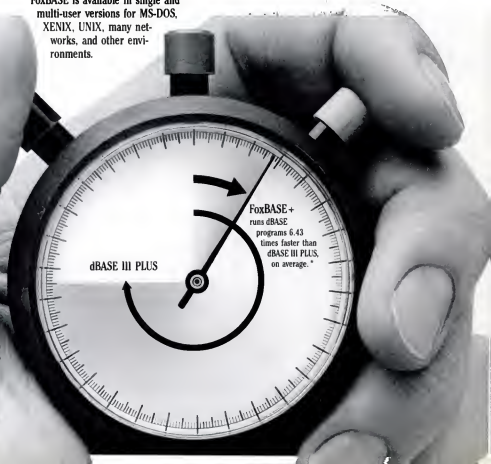
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\*Computed as reported in *Communications of the ACM*, Vol. 31, No. 11, November 1988, p. 1011. Benchmarks are for 100,000 records. \*\*For MS-DOS Multi-user XENIX version available at \$750. FoxBASE and FoxBASE+ are trademarks of Fox Software. dBASE II and dBASE III PLUS are trademarks of Ashton-Tate. Clipper is a trademark of Borland. dBCOMPILER is a trademark of WorldTech Systems Inc. dBMAN is a trademark of VersaSoft Corporation. UNIX is a trademark of AT&T Bell Laboratories. XENIX and MS are registered trademarks of Microsoft Corporation.



## ■ FROM THE EDITOR'S SCREEN ■ BILL MACHRONE

# DAMN THE MAC!



*When the Macintosh first appeared, PC users correctly dismissed it as a toy. Times have changed—we have to admit that it can teach the PC a few tricks.*

This country is built on the premise that competition is good. Sure, products fail, companies fold, and people occasionally lose their shirts. But the result is a strong, vital, inventive economy, where cream rises and new ideas are welcomed.

There are impediments to progress, however. One of them is standards. While they save companies money, they can also strangle innovation. Not that standards are bad—imagine the chaos if paper sizes weren't standard. But the IBM standard in business is a mixed blessing. It saves us a fortune by giving us a known quantity, one that's flexible, expandable, and predictable. We also save a bundle on software, because software developers aren't continually reinventing the wheel.

But for all its standardization, the IBM PC is a Portuguese man-of-war, a collection of specialized entities living together, rather than a tightly integrated organism.

Take, for example, graphics. We have Hercules, CGA, EGA, Enhanced EGA, VGA, and 640 by 400 "standards" today. Tomorrow, we'll have more. There are three different ways of organizing and accessing memory in AT-class machines. The 80386 gives us one or two more. We have as many user interfaces as we have applications programs, with some of the newcomers giving a nod to market leaders. So we have Lotus-like interfaces and pull-down menu interfaces, but no standardization. Function keys, cursor keys, and even the backspace key change their meaning as you move from program to program. And we won't even talk about networking.

**MAC TRANQUILLITY** Over on the other side of the market, however, is the Macintosh. It started as a clever toy, overpriced and underpowered, and that image remains in the minds of most PC users. The Mac has actually been through some major changes. You can now take it out to 4 megabytes, pop in faster versions of the 68000, daisy-chain fast hard disks off the SCSI port, add a full-page-sized monitor, and, if you can believe it, an IBM-compatible keyboard.

What's going on here? Standardization. The Mac programmer is virtually obliged to use the interface that Apple designed into ROM. Thus, if you know how to work one Mac program, you know how to work all of them. We should be so lucky on the PC side.

The Macintosh was the result of an incredibly synergistic development program by a group of otherwise difficult and iconoclastic designers and programmers.



Many of them have since left Apple, but not the Macintosh market. They remembered the Mac's design precepts and produced a bunch of products that would have been naturals to have come from Apple. The most amazing one is the Radius page-sized screen. The geniuses behind the Radius are none other than former Mac team members Burrell Smith and Andy Hertzfeld. No one else could have done such a tightly integrated product. It's designed to sit to the left of a Macintosh. Its surface and the Mac's existing screen create an inverted-L area on two screens where you can move the cursor or display text and data. Better yet, a program's dialog boxes can be directed to the Mac's screen while you run a full-page edit unimpeded on the big Radius monitor.

I recently had a chance to use the Radius on a Mac Plus, along with *Microsoft Word*, Version 3.0, and *DataDesk's* 101-key keyboard. The result was superb. Anyone with any sense at all has always hated Apple keyboards, and the Mac's stock keyboard is among the worst. It's so bad, in fact, that they can't sell it in Europe. The Germans have a standard for everything, and their standards often influence the buying decisions of the Common Market countries. The standard Mac keyboard doesn't meet DIN specs, while the IBM keyboards do. So this is a True Blue keyboard layout for the Mac.

The Mac's predictable, graphics-oriented interface gives considerable freedom to software designers (no, this isn't 1984-style newspeak). For instance, you can define a box of a given width in *Word*, with

## ■ FROM THE EDITOR'S SCREEN

several choices of line styles. When you type in the box the line wraps according to the left and right borders. When you get to the bottom of the box, it stretches downward to accommodate your text. Try doing

that on a PC and making it run in half a dozen different graphics environments.

The PC makes it nearly impossible to scale fonts and use other WYSIWYG techniques to ensure the quality and appear-

ance of your finished document. The lack of standardization in printers makes it even harder to know that what you see on the screen will bear some resemblance to the finished product.

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**WHAT'S WIGGINS?** Dave Tarrant, president of Lotus's graphics products group, is espousing the idea of WYGINs (pronounced "wiggins"), or What You Get Is No Surprise. His new *Freelance Plus* is a presentation-graphics analog of *Microsoft Word*, in that the program is aware of the output device's fonts and capabilities. While the program makes no attempt to represent what the fonts you choose will look like on the finished page, it knows where and how to wrap and space lines of text.

There is a solution for the PC's current middle: more standardization. It's time for applications programs to grow up, to get civilized. And it's certainly high time for the operating system to take over the user interface and peripheral device driver desks. The Mac corrected many of the mistakes of earlier personal computers, but these modifications came at the expense of expandability. It compounded the error with a too-small screen and a wimpy keyboard. The Mac's original designers and some other bright people are correcting the mistakes, demonstrating that there's really no such thing as a closed architecture. Likewise, the PC's software architects are learning from their mistakes, and they are recognizing the inherent vitality of the peripheral jungle that surrounds the PC.

The new standard will inevitably be *Microsoft Windows*. No one else is even close to supplying a user interface that offers consistent program-to-program operation, device independence, WYSIWYG, and broad support. Of course, *Windows* is largely unsuited to slow 8088-based machines and the original Color/Graphics Adapter. It begins to come to life in an AT-class machine. Although it still needs hardware assist in the form of graphics co-processing, those products are in the pipeline.

The PC needs to have Mac-like standards if it is to progress. All the better mousetraps have had their day; let's get down to business.

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■ JOHN C. DVORAK

# HIGH-TECH PR: A NEW ANIMAL



*The high-tech public relations industry has gotten smarter. Its practitioners now shun the press, preferring to co-opt the industry analysts reporters feed on for information.*

There's a cruel world outside. It's systematically after one thing—the money in your wallet. Bogus products, false claims, and promises of wealth and fame are all used to pick your pocket, steal your pride, rob your self-esteem, destroy your confidence, and quash your independence—in short, leave you a penniless wreck and line the pockets of a few fat cats.

Is that what's bothering you, Bunky? Do you wonder how it's done, and who is doing it?

Perhaps it's the secretive public relations pro who lurks behind every fad, every fashion, every phony trend. If that's true, we, the members of the press, are the unwitting conduit for their carefully planned promotions. In high-tech public relations, the stakes are high and the techniques are new.

**PR OF OLD** The publicist and PR man of the old school used to get the job done by knowing the right editor and planting a story here or there. They'd get the client a feature story, a spot on TV, or a talk show half hour.

But a person who toots his own horn on a talk show is effective only if he is charismatic and loaded with hot, interesting anecdotal material.

As the high-technology industries grew and demanded their collective share of public attention, they discovered a paucity of charisma. Most of the big high-tech winners are introverted and socially awkward, and need, at the minimum, a few courses in public speaking and a few help-

ful hints on acquiring social grace.

Put one of these guys on a talk show and watch the ratings fall faster than a Central American government. Worse, few are quotable and many simply cannot communicate with the general press. (The general press, I might add, tends to be liberal and finds these people too rich to be likable, making matters worse.)

Furthermore, the general press is seldom technical enough to ask the right questions of these fellows. I've heard complaints from more than a few CEOs about this or that reporter who "asked the dumbest questions ever" or "wanted me to explain everything, as if I had nothing better to do."

**HIGH-TECH PR** Enter the high-tech PR company to the rescue.

High-tech PR (invented, arguably, by superstar promoter Regis McKenna) uses new and subtle techniques to promote its

companies and their products.

Only recently did I finally figure out how the best ones do what they do. First of all, they do not emphasize direct press contact. They aren't very good at it and they even try to suppress it. Some of these firms are plain insulting to the press. This throws you off when you try to understand high-tech PR.

The press is astonished (shocked may be a better term) by all this. Who ever heard of a PR person that screws with the press?

**THEY DON'T CARE** These guys do it because they don't care about the press at all. They've co-opted the all-important research company analysts. That's what high-tech PR is all about. I figured this out after the umpteenth so-called press conference that I attended. Most of the attendees were people from research companies. They're the ones who are sold a bill of goods by the PR firm.

After all, when the press does a story, it ends up asking an easily accessible analyst for an opinion. The analyst spouts the party line fed to him by the PR firm, the company gets the publicity it paid for, and nobody is the wiser.

Check it out in your daily newspaper. Who are the "experts" who are always cited in high-tech stories? Research company analysts, that's who. Analysts who have seldom worked in the industry of which they speak so eloquently. They seem to know what they're talking about, though. Sure they do. The high-tech PR firm told them what to say.



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### Q-DOS II FILE LISTING SCREEN

```

      PEEK 3D                                     @-S00: Structure Map
-----
LIMBETS | AUTOCORR
        | BMSH11
        | DENSE | CUSTOMER | BILLING | ADVANCE
              | MAILLOT | PAGELINE
              | PARALLEL
        | FOR [REDACTED]
        | LOTLN | ACCOUNT | SYBA   |
              |         | VPOB   |
              |         | VPOS   |
              |         | JNDRITE |
              |         | JNDRTIME |
              | PRICING
        | SINKSCZ
        | UTILITY
        | WAREHOUSE | FOLDER

Note: Operator : Blank field = Unbuffered operation. RETURN to select
Use arrow keys to move cursor or press ESC to quit

```

Directory Tree View Copy New Find Case Rename Space Print						
(Left-click for file attributes, Normal, Directory, Plain Text, Volume, System)						
PAID 10						
Chart	Total Size	File Name	Size	Date	View	
31 Files	230,948					
5 Directories						
7 Tagged	34,443					
FILE NAME	FILE SIZE					
CD - Copy Disk 1	1,048,576		11	1-10-90		
CD - Copy Disk 2	1,048,576		104	2-20-90		
CD - Copy Disk 3	1,048,576		274	6-20-90		
CD - Copy Disk 4	1,048,576		1,048	1-10-90		
CD - Copy Disk 5	1,048,576		8,764	8-10-90		
CD - Copy Disk 6	1,048,576		27,210	8-10-90		
CD - Copy Disk 7	1,048,576		11	1-10-90		
CD - Copy Disk 8	1,048,576		10,352	7-10-90		
CD - Copy Disk 9	1,048,576		1,048	10-10-90		
CD - Copy Disk 10	1,048,576		8,764	7-10-90		
CD - Copy Disk 11	1,048,576		1,048	10-10-90		
CD - Copy Disk 12	1,048,576		1,048	10-10-90		
CD - Copy Disk 13	1,048,576		1,048	10-10-90		
CD - Copy Disk 14	1,048,576		1,048	10-10-90		
CD - Copy Disk 15	1,048,576		1,048	10-10-90		
CD - Copy Disk 16	1,048,576		1,048	10-10-90		
CD - Copy Disk 17	1,048,576		1,048	10-10-90		
CD - Copy Disk 18	1,048,576		1,048	10-10-90		
CD - Copy Disk 19	1,048,576		1,048	10-10-90		
CD - Copy Disk 20	1,048,576		1,048	10-10-90		
CD - Copy Disk 21	1,048,576		1,048	10-10-90		
CD - Copy Disk 22	1,048,576		1,048	10-10-90		
CD - Copy Disk 23	1,048,576		1,048	10-10-90		
CD - Copy Disk 24	1,048,576		1,048	10-10-90		
CD - Copy Disk 25	1,048,576		1,048	10-10-90		
CD - Copy Disk 26	1,048,576		1,048	10-10-90		
CD - Copy Disk 27	1,048,576		1,048	10-10-90		
CD - Copy Disk 28	1,048,576		1,048	10-10-90		
CD - Copy Disk 29	1,048,576		1,048	10-10-90		
CD - Copy Disk 30	1,048,576		1,048	10-10-90		
CD - Copy Disk 31	1,048,576		1,048	10-10-90		
CD - Copy Disk 32	1,048,576		1,048	10-10-90		
CD - Copy Disk 33	1,048,576		1,048	10-10-90		
CD - Copy Disk 34	1,048,576		1,048	10-10-90		
CD - Copy Disk 35	1,048,576		1,048	10-10-90		
CD - Copy Disk 36	1,048,576		1,048	10-10-90		
CD - Copy Disk 37	1,048,576		1,048	10-10-90		
CD - Copy Disk 38	1,048,576		1,048	10-10-90		
CD - Copy Disk 39	1,048,576		1,048	10-10-90		
CD - Copy Disk 40	1,048,576		1,048	10-10-90		
CD - Copy Disk 41	1,048,576		1,048	10-10-90		
CD - Copy Disk 42	1,048,576		1,048	10-10-90		
CD - Copy Disk 43	1,048,576		1,048	10-10-90		
CD - Copy Disk 44	1,048,576		1,048	10-10-90		
CD - Copy Disk 45	1,048,576		1,048	10-10-90		
CD - Copy Disk 46	1,048,576		1,048	10-10-90		
CD - Copy Disk 47	1,048,576		1,048	10-10-90		
CD - Copy Disk 48	1,048,576		1,048	10-10-90		
CD - Copy Disk 49	1,048,576		1,048	10-10-90		
CD - Copy Disk 50	1,048,576		1,048	10-10-90		
CD - Copy Disk 51	1,04					

This easy-to-read directory map shows you all directories on the disk while allowing effortless creation and removal of directories. One keystroke gives you access to any directory on any disk. Seeing the directory structure in this way helps you better understand your hard disk.

### Q-DOS II OFFERS FEATURES NOT FOUND IN DOS:

Find Any File on Any Disk in Under 5 Seconds • Edit and Print Files • Instantly Display Sorted File Listing • View and Change File Attributes • Perform DOS Backup of Your Entire Hard Disk • Copy, Rename, Erase or Move Groups of Tagged Files • Compare Two Separate Directories Instantaneously • Instant Directory Map of Any Disk • Online Context-Sensitive Help Screens Provide Instant Access to the Manual • Customize Screen Colors

**Q-DOS II ENHANCES THESE DOS FEATURES:**

Copy • View • Rename • Make and Remove Directories • Change from one Drive to Another • Display Available Space and Memory

## WHAT THE EXPERTS ARE SAYING

*"In fact, when my department had to make a decision on software for our secretaries who are computer novices, we chose Q-DOS since we felt that newcomers would...appreciate Q-DOS's more extensive online help."* - **B. SIMON, PC MONITOR, April 1986**

"Q-DOS...is one of the better programs available, especially for the novice user." - PC MAGAZINE, May 13, 1986

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■ JOHN C. DVORAK

# INSIDE TRACK

*Fall Comdex '86 will be remembered for hot graphics displays, desktop publishing, and the ubiquitous 386.*

**F**all Comdex 1986: Consensus: things are picking up. Theme of the show: 80386 mania. Subtheme: desktop publishing. Most crowded booth: Atari (who knows why?). Most empty booth: anything in the Sahara Hotel. **Important no-show: Apple** (who knows why?).

What am I supposed to say about Comdex? Peter Lewis, of the *New York Times*, claims he counted 107 new 80386 machines at the show. That sounds like a hundred machines too many. Perhaps 107 machines too many. On top of that, every Larry, Moe, and Curly was showing some sort of desktop publishing package. I'm not even sure what desktop publishing is anymore.

As usual, the show was scattered all over town with exhibits at the Convention Center, the Hilton, Bally's Grand, the Riviera, and the Sahara. This spread meant that it was (again) theoretically impossible to see the whole show. But who wants to see the whole show? Let's face it, one too many outfits at the show will have changed their names and headed for Mexico with the cash or simply gone broke by this time next year.

Then again, many companies look to be around for the duration. U.S. Robotics was at the show with its new 9,600-bit-per-second modem. The company expects to sell the thing for about \$995. Over a year ago, when it launched its 2,400-bps modem, it offered computerized bulletin board systems operators a special discount in an attempt to get 2,400-bps capability into the BBS scene. The company intends to do the same with the 9,600-bps screamer. Contact U.S. Robotics if you want state-of-the-art capabilities for your BBS at a fat discount. Highly recommended. I like these guys.

Elsewhere, I saw my old pals from

Boeing with their new LAN version of *Boeing CALC*. Boeing has repackaged its 3-D spreadsheet and popped a fancy hologram on the box to make it distinctive. More important, it now has released a full-blown network version that has record locking and other necessary features for use on a LAN. Hot stuff.

If you wanted to see the future, you went to the Aldus booth, where Paul "Mr. Desktop Publishing" Brainerd showed off *PageMaker* for the IBM PC. He had it running on dozens of different large screens. It seems that the 19-inch square-dot 1,024 (or more) by 1,024 (or so) black-and-white monitor is the "in" thing. All these big monitors do their best work via *Microsoft Windows*. While Microsoft would like to make *Windows* a standard, it seems unlikely until the micro community at large decides that it needs one of many oddball large displays. Then they'll discover that only *Windows* can deal with this flood of incompatible displays and controllers. And, believe me, the flood is coming.

*Windows* is ridiculed as a memory and performance hog. These complaints fall by the wayside when you want to use your 2,473 by 1,024 tube.

This amuses me because it's a repetition of the good old days before IBM bumbled onto the scene. Back then it was CP/M posing as the universal operating system. It was the only OS that could talk to all the wacky disk drives. Later, IBM standardized all that (along with port addresses and other important things). Now that IBM seems to be backing out of port like the *Titanic* on its last voyage, it's leaving a big gap. It never standardized high-resolution display technologies. Once we go beyond the EGA nothing is standard: the scan rate, total

pixels, interface, nothing. Sure, there may be a new improved EGA from IBM, but we cannot expect the super displays we are seeing from independent vendors. And like the days when the disk drive makers all did it "their way," these guys all have the better idea. Meanwhile, how to make it all compatible? *Windows!* Score Bill Gates: 1, cynics: 0.

Meanwhile, I keep wondering where the heck is a new operating system for the PC. I want to see an MS-DOS-compatible system with unlimited memory, caches, and performance. Every time I mention this to vendors who I know could do an OS, they always say, "There's no money in it." During the halcyon days of the Radio Shack Model One, there were three or four companies that made a fortune on improved versions of Radio Shack's TRS-DOS. Now, somehow, it can't be done. Will some genius explain this phenomenon to me?

The slew of 80386 machines may help the scene. Softguard has its VM-386 and Software Link has its PC-MOS/386, but these were unfinished at the show. And we still don't know when the 80386 will be accepted as the standard. It seems that despite what Intel says, there will be no 80387 math coprocessor for at least a couple of years. The 80287 and the 8087 have never been optimized and are hardly dream chips. (Techies complain that they get so hot that they weld themselves into the chip sockets.) We need floating-point help for our graphics.

Finally, as test results sneak out, we discover that at the exact same clock speed, the 80386 is just over 10 percent faster than the 80286. Big deal. From a marketing standpoint, though, a 16 MHz 80386 is much sexier. "They're selling like hotcakes. Nobody has the faintest idea how hot this machine is," Rod Cannon, Compaq CEO, tells me with a smirk. Smart move by Compaq to go for broke with an early announcement.

More on the show next issue. ☐

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■ PETER NORTON

# THE SOFTWARE REVOLUTION, PART 2



*In the second of a three-part series on the ongoing revolution in programming languages and environments, Norton extols the virtues of Microsoft's QuickBASIC compiler.*

Without a great deal of attention from the PC community, a quiet revolution has been going on in the world of programming and program development. This revolution is twofold: programming languages have been changing, and the ancillary tools available to programmers have undergone even more of a transformation.

As I mentioned in last issue's column, the best-known change, and probably the most surprising, has been the rapid shift to C as the programming language of choice for top-flight programmers. Even the champions of C are startled at just how quickly C's status rose from the enthusiast's favorite underdog to the professional's-choice top dog.

While the shift to C (which has largely been a shift away from Pascal) is fairly obvious, much less well known is the shift that's been going on in the nature of compilers.

In the not-so-long-ago dark ages, programming language compilers worked in a completely dumb way: you fed them your program source code and they would spit out either a compiled program or the error messages that told you why your program couldn't be compiled. With this sort of compiler, programmers worked in an edit-and-compile loop, alternating between two tools, a programmer's editor and a compiler.

This kind of batch processing is certainly OK for some things, but for writing and debugging programs, it's a really stupid way to work. Even though I'm in the business of selling a programmer's editor, I

know that today such tools are technologically obsolete.

**INTEGRATED TOOL** Since writing and testing programs can be an integrated task, they ought to be done with an integrated tool: a combined editor-compiler. Combining the two tools not only obviates the time-wasting task of switching back and forth between them, it lets the compiler tell the editor how to direct your attention to where the errors are.

The pioneer in this arena was, as we all know, Borland's Turbo Pascal. Even the language wizards at Microsoft openly salute Philippe Kahn, founder of Borland, for the impressive innovation that Turbo Pascal represented.

Microsoft tested the waters of Turbo-type products with the first release of QuickBASIC and then really got serious about it with Version 2, which came out in mid-1986.



I've been playing with Version 2, and I'm darned impressed.

The best acid test I performed on QuickBASIC was handing it an old interpreter-BASIC accounting package that I used to use. This little number ran over 4,000 lines of code, broken into a dozen modules that were CHAINED like crazy. It was as messy an example of a convoluted BASIC program as I knew of to prove QuickBASIC's mettle.

I remember that when Microsoft's original BASIC compiler came out, I had tried to use it to speed up some BASIC programs I used. But in every case, the old-style compiler choked on the aspects of BASIC that were interpreter rather than compiler oriented. I always found that it simply wasn't worth the trouble to modify these programs so that they could be compiled. So I had two choices: either I had to live with sluggish performance or trash my initial investment in code.

**QUICKBASIC'S REAL VIRTUES** The QuickBASIC compiler eliminates the problem that crippled the original BASIC compiler. QuickBASIC handles (with minute exceptions) everything the interpreter can. In my accounting program acid test, QuickBASIC came through like a champ—it compiled the dozen routines effortlessly, and they worked perfectly.

That acid test, though, really just checked out QuickBASIC as a superior compiler—one that could swallow all the quirks and flaws of interpreted BASIC. The real virtues of QuickBASIC lie in two other areas.

## ■ PETER NORTON

One virtue is that it's "Turbo BASIC"—meaning a really good integration of an editor and a compiler into an interactive tool.

The other is the redirection of BASIC

away from what's most severely wrong with BASIC (line numbers, clumsy constructs) and toward what's needed for modern languages (good logic and loop control).

**SNEERING SNOBS** It is common practice for programming-language snobs (and I admit to being something of one) to sneer at the likes of BASIC for its wordiness and lack of structure. The fact, however, is that BASIC is still by far the best tinkering language around, and it's certainly the best for writing quickie programs to do this or that.

It's the best tinkerer's language for two reasons: it's so easy (and especially unfussy) to knock out some code in BASIC, and BASIC gives you thorough, built-in, and handy access to all the PC's special features—sound and music, screen color and graphics, keyboard scan codes, all that sort of stuff.

So what a wonderful marriage you find in the QuickBASIC compiler. Everything that's neat about old-style BASIC, plus the

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■ The QuickBASIC compiler eliminates the problem that crippled the original BASIC compiler. QuickBASIC handles everything the interpreter can.

ease of the Turbo Pascal concept, good modern coding features, and reasonable (if not blinding) speed. I really love doing all my programming quickies in QuickBASIC now.

**IN THE WORKS** Obviously, QuickBASIC isn't a one-of-a-kind product for Microsoft, which openly admits that it has plans for other Quick languages. Like IBM, Microsoft won't officially discuss unannounced products that are in the works. But with a wink and a nod, Microsoft's language people make it pretty clear that they consider Quick-C to be the priority item on their list of projects. The reasons are obvious: C, as I mentioned, is the clear present and future winner in the program-

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ming-language race, so that's where the action will be in compiler sales.

**ASLEEP** What I find amazing—and it turns out that Microsoft's Quick-language people share my amazement—is that Borland has been asleep at the switch here. Borland built its success on Turbo Pascal. While Turbo hasn't been Borland's only big success (*SideKick*, of course, is equally a monster hit and *Reflex* has not done so badly either), it was the firm's first achievement in technology and sales. You'd expect it would quickly follow with more of the same for other programming languages. But so far we've seen only the small-potatoes Turbo PROLOG. Some have been saying Turbo PROLOG was just a distraction that kept Borland from working on the really big item.

■ With a wink and a nod, Microsoft's language people make it pretty clear that they consider Quick-C to be the priority item on their list of projects.

The Microsoft wizards figure that Borland has left them a huge opportunity here, and they are going to go for it. I'm sure that the MSer's consider themselves to be in a secret race with Borland to get a hot Turbo/Quick-C out to the public. I'm not sure if Borland is actually also in the race, but I know it should be.

With any luck, you'll be seeing a good interactive C—whether it's Turbo-C or Quick-C—out soon. Maybe even in the time it's taken for these words to pass from my keyboard to the printed pages you're reading. I think that it's more likely that you'll see one from Microsoft than from Borland, but it'd be great to see them both and let the marketplace decide who has the honest interactive C.



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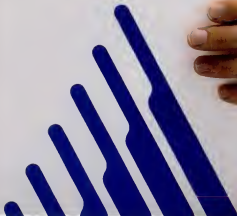
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**CIRCLE 142 ON READER SERVICE CARD**

■ JIM SEYMOUR

# TWO KEYS TO THE PC GRAPHICS EXPLOSION



*NEC's MultiSync has become one of those rare hardware standards that promote rather than inhibit innovation. Will Windows be the software standard with the same effect?*

**F**unny, isn't it, how standards sometimes creep up on you in this business?

I'm not talking about how war-horses like dBASE grew out of Vulcan into the most widely used high-end data management product, nor how WordStar vanquished its only serious early competitor, Magic Wand, and went on to dominate the PC word-processing world—at least for a couple of years.

Standards that evolve that way—present at the creation, so to speak, and good enough to beat back the early competition—are found in every industry, and are easy to understand (if not so easy to spot in their nascent stages).

What I'm talking about are those sneaky products that simply preempt a corner of the market, and that we quickly and quietly come to accept as a standard, without the fanfare and hoopla of head-to-head combat with the competition. Of which, often, there isn't any.

I'm thinking particularly of the NEC MultiSync color monitor, which stands as a superb example of a product inventing a category and completely taking it over, and that category then becoming more important than anyone, the company included, ever guessed.

Most of us thought the MultiSync was merely one of the best EGA-compatible color monitors we'd seen. And it is, it is.

**HIGH FREQUENCY** But the variable scan rate promised by its name left open the possibility of running other, higher-resolution products, such as IBM's Profes-

sional Graphics Controller (PGC), on it as well. Higher-resolution video displays demand higher-frequency scan rates, and the MultiSync was one of the few affordable monitors that could run under the PGC.

Trouble was, IBM's PGC never became exactly a hot seller. Going to a little more resolution and a lot longer color palette certainly sounded like a good idea, and was—for a very few people. But the IBM PGC is a slow, kludgy, expensive way to get there, and it has become the Standard Time Forgot. R.I.P., and no regrets. I don't have access to IBM's sales figures for the PGC cards, but I'll bet there are a lot more of them in the warehouse than in users' PCs.

Which left the MultiSync a little lonely. The price (about \$550 from the discounters) made it competitive with ordinary EGA monitors, and its high quality has made it a smash success in that market: NEC can't build 'em fast enough.



But as good as the MultiSync looks running with a standard EGA card, that's still far from showing its potential.

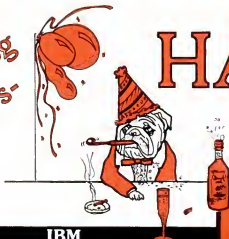
Along came the people from Video-7, the first of what will be a big crowd to recognize that in the unlikely duo of Microsoft Windows and NEC's MultiSync lies a gold mine for video-board vendors.

The device-independence of Windows—which is a fancy way of saying it handles the job of sending data out to the monitor, so applications running under it don't have to know what they'll find out there—means video-card makers no longer have to live in fear that even if they create a new, better-than-ever "standard," they may not be able to persuade enough software vendors to write display drivers for their new toys.

(That of course partly accounts for the near-disappearance of the IBM PGC "standard"; few applications programs ever supported it.)

**WINDOWS DEPENDENT** This scenario depends, of course, on Windows becoming a fairly widely used graphical-interface standard. I'm becoming a Windows fan, in large part because it encourages precisely this kind of technical innovation by hardware makers. (It ought to make software development faster and easier, too, by freeing programmers from the grief of writing a dozen video drivers and ten dozen printer drivers for every new program. But that depends on how many developers are willing to bet their products and their prospects on Microsoft's success with Windows.)

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## ■ JIM SEYMOUR

Video-7's new VEGA Deluxe board provides all the old favorite graphics standards (IBM Monochrome Display Adapter, IBM Color/Graphics Adapter, and Hercules Graphics Adapter). In addition, it offers the "old" EGA resolution of 640 by 350 pixels, plus two new ones (on the MultiSync, and presently only when it's running *Windows*): a souped-up EGA resolution of 640 by 480, and a really dazzling if oddball-sounding 752 by 410.

Ratcheting the original EGA standard up to 640 by 480 is nice. But the 752 by 410 numbers are the really interesting ones because to my eye that looks like the threshold of resolution needed to really make *Windows* come alive. That attractive so-called Helvetica type font *Windows* uses on-screen looks better and blacker,

■ The NEC MultiSync monitor stands as a superb example of a product inventing a category and completely taking it over.

and, more important, 752 by 410 finally eliminates the "graininess" of EGA images.

**NOT ALONE** NEC isn't alone with its variable-scan-rate monitor: Sony has introduced its Multiscan. And Video-7 won't be alone with its higher-resolution cards designed to take advantage of those monitors that can break the EGA barrier.

Indeed, one of the biggest stories in the PC business in 1987 will be the wild profusion of newer, higher-resolution graphics boards. Not all will exploit the device-independence of *Windows*, but many will; and those boards that don't rely on *Windows* to manage the screen run a serious risk of being left behind, as applications software publishers decide they've had it up to here with trying to write screen drivers for every new card that comes along.

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spite the success of the MultiSync and the probable success of products like the VEGA Deluxe—we can leave behind the days when programs have to know what display we're using.



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■ STEPHEN MANES

# SPREADING DOOM



*In a definitive assessment of what's behind this country's economic problems, the learned Dr. Elmer Roundhaus clarifies his abstruse treatise, "Spreading Doom."*

**D**r. Elmer Roundhaus of the Coolidge Institute is one of our nation's most original economic thinkers. Three years ago, he was virtually alone in predicting the dollar's recent decline against Romanian currency. That now-famous article "The End of the Five-Cent Lei" has been cited as the seminal work of the so-called Times Square School of economics.

His most recent monograph, "Spreading Doom," is incomprehensible to the layman and "no easy read, that's for darned sure," according to one prestigious journal of economics. But because of its importance, Dr. Roundhaus agreed to discuss his remarkable thesis with me. Here is the complete transcript of my interview with the good doctor:

*What is the single greatest danger to American business today?*

The computerized spreadsheet.

Why?

The best evidence is what, I blush to note, has been termed the Roundhaus Curve. To state it briefly as it applies in the business world: The general health of a given organization declines in direct proportion to its purchase of spreadsheets, with a 1-month delay. The time lag appears to reflect difficulty in deciphering the manuals.

*Why do you believe the spreadsheet is so pernicious?*

Let us review some history. Since ancient times, all mathematical calculations of any consequence were kept entirely in

the hands of experts. Compute interest? Figure taxes? Calculate batting averages? Such procedures were Arabic to everybody but the specialists.

The electronic calculator changed all that. B.C.—before calculators—no one had the vaguest idea how much he was actually earning, paying in taxes, spending on loans, or receiving from investments. Mr. B. Numberless (as I jocularly call him) thought 5 percent annual interest on his one-thousand-dollar account at First Tasmanian Savings was just fine. Five percent compounded daily, with a stuffed gecko thrown in for free—why, that sounded like the royal road to riches!

Then came the calculator. With this, Mr. I. Digit discovered that 5 percent was 50 bucks a year and compounding it daily made it maybe \$52.53, and after taxes that left \$27.54 and the gecko. At that point, he said the hell with it and put the money into a limited-edition solid-gold toothpick in

the shape of a hockey stick.

The calculator, you will recall, ushered in an era of wild inflation as banks raised interest rates to woo depositors back. Worse, when calculators hammered home the fact that people got to take home just 26 cents of every additional dollar they made, many began playing with their calculators instead of working at their jobs.

The calculator's worst effect was this productivity-killing speculation. An eight-digit display allowed one to calculate, and therefore fantasize about, amounts up to 100 million dollars, assuming, correctly, that one was not interested in cents. Once Californians could press three buttons and learn they could become millionaires simply by selling six houses over a period of 8 months, the concept of fiscal moderation was doomed forever.

*Where does the spreadsheet come in?*

The spreadsheet is to business what the pocket calculator was to ordinary check-book-balancing folks. For years America always worked fine on the principle that nobody who ran a business really knew how it was doing. As long as there was a profit at the end of the year and maybe a dividend to keep the stockholders happy, who cared if you could squeeze an extra 10 percent profit out of Plant Number 63?

The spreadsheet changed all that. Now the president of American Widget can see in endlessly depressing detail that she can get a better return by buying Deaf Smith County Bonds rather than marketing fuzzy toilet bowl covers, and she won't even have to commute to the office. At some



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*Can you cite a specific example?*

The classic case study comes from the world of computer magazines. *EasyUsers* quickly built a huge circulation with popular features like the Swimsuit Issue and the Users of the Month—male and female, discreetly posed at their machines. Its contests for DOS-prompt supercharging and sexiest AUTOEXEC.BAT file drew thousands of entries. Its "road tests" of hardware and software were industry standards. At computer gatherings, you saw its slogan on every second baseball cap: "For the hard-drivin' computer jock—and Jill."

In a fit of what he thought was corporate responsibility, the comptroller went down to the local software bar and cried, "Lotus for everybody—on me!" Junior executives quickly developed models that showed conclusively—spreadsheets always show things conclusively—that major savings could be effected.

The budget for the Users of the Month feature was slashed so severely that the art director ran around the office with his Kodak Disc trying to convince the mailroom help to disrobe. Contest grand prizes were downgraded from entire PC AT systems to \$25 Radio Shack gift certificates. The professional writers who produced the "road tests" were replaced by bright junior-high kids who thought computers were neat. Typesetting was replaced with "near-document-quality" output from an in-house dot-matrix printer.

The spreadsheets projected profitability like nobody's business. The only thing they didn't predict was the plummet in circulation and advertising. After 3 months, *EasyUsers* held a farewell party and nobody came. A sad story. By no means unique.

*Have there been any positive developments since the publication of your latest article?*

Positive? Are you kidding? The delay factor in the Roundhaus Curve is declin-

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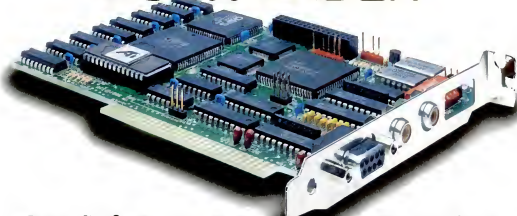
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EGA Wonder also runs EGA, CGA, MDA, Hercules and 132 Columns on an RGB Monitor, \*Composite Monitor, and the IBM Portable P.C. in 64 colors (shades). EGA and Hercules software are interlaced for high resolution text and graphics.

\*Composite Monitor and PC Portable display not shown

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Compatible to EGA, CGA, MDA, Hercules	✓	✓	✓
256K Video Memory	✓	✓	✓
Automatic Switching Between EGA and CGA Color Modes and Among EGA, MDA, and Hercules Modes	✓	✓	
Runs EGA, CGA, MDA, Hercules and 132 Columns on an EGA Monitor	✓		
Runs EGA, CGA, MDA, Hercules and 132 Columns on an RGB Color Monitor	✓		
Runs EGA, CGA, MDA, Hercules and 132 Columns on a TTL Monochrome Monitor	✓		
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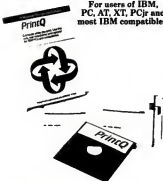
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■ STEWART ALSOP

# THE PERFECT LAPTOP



*Do people want lightweight, low-cost, travel-ready second computers or ones that serve equally well as desktops or laptops? Fellow columnists and laptop designers, take note.*

Many of my brother columnists are running around these pages saying that the perfect laptop computer is something like the Toshiba T1100 Plus. A fully IBM-compatible computer that weighs less than 10 pounds; comes with 512K bytes of memory, two disk drives, and a full-size display; and sells for "only" \$1,995. As usual, they're all wrong. Unfortunately, though, computer makers are listening to these guys and persist in designing laptops the wrong way.

Here's where they're wrong: Most designers are stuck on the idea of making a single computer that can serve as either a desktop or laptop computer, sort of an "all-in-one" machine. That means it must have at least two floppy disk drives (or one floppy and a hard disk drive). Even with today's tiny 3½-inch disk drives, such a computer will end up as big as a briefcase and weigh at least 10 pounds. It will also cost more than \$1,500 and use a lot of battery power.

**ALL THE PEOPLE** As we all know, any time you try to satisfy all the people, you end up satisfying no one. The real problem with this approach isn't so much that you can't make a satisfactory computer in a small lightweight package, but that the package doesn't recognize the way people treat their computers. For instance, if you're anything like me and 99 percent of the people I know, your computer is stuffed with boards and attached to the wall and various peripherals with a snakepit of cables and wires. Even if you want to travel with a computer, you're not likely to

detach and disassemble the one on your desk, no matter how lightweight it is.

The right way to design a laptop is as a lightweight, intelligent disk drive (so it doesn't have to have its own) with its own keyboard and screen. In other words, the design constraints of the perfect laptop computer are size, weight, price, and usefulness. The computer must be small enough to fit inside a standard briefcase; it must weigh less than 5 pounds; it must be priced like an add-on (less than \$500 or so); and it must be able to satisfy people who are used to using a full-fledged desktop computer.

I'm writing this column with a Tandy Model 100 laptop computer. When I started the column, I was sitting in an airplane somewhere over Utah. The Model 100 was designed 3 years ago according to exactly the same principle I outline above: a cheap, small, lightweight, usable second computer. Indeed, the Model 100 was the

product of a vision of a notebook computer that was specified by a man named Kazuhiko Nishi, sort of a Japanese Bill Gates (he actually even served as vice president of Microsoft for several years).

Although the computer was well received at first, a perception developed that the computer was a failure in the marketplace. On the contrary, it actually became the best-selling laptop in the industry, with shipments of as many as 10,000 units per month.

**OLD TECHNOLOGY** Meanwhile, technology has passed by the Model 100. The Model 100 uses 16K-bit memory chips and comes with only 24K bytes of RAM and 32K bytes of ROM. It uses an old and very slow processor called the 8085. It comes with a 300-bit-per-second pulse-dial modem, though 1,200-bps tonal modems have been squeezed onto a couple of chips. It uses an unenhanced 40-character by 8-line LCD screen, when low-power supertwist LCD displays can now give as good contrast as a desktop monitor.

If, like me, you've gotten used to fast processors like the 80286, fancy hi-res displays like the NEC MultiSync, powerful software like *Microsoft Word*, *Microstuf's Crosstalk*, or *Symantec's Q&A*, fast communications at 1,200 or 2,400 bps, and lots of memory, all of a sudden the Model 100 seems inadequate. That's probably why columnists think you need to reproduce your desktop computer.

The truth of the matter is that a more-than-satisfying laptop computer is entirely



## ■ STEWART ALSOP

possible to design today. Imagine this: a computer the size and weight of the Tandy Model 100 (4.5 pounds; 1.5 by 16 by 8 inches) but with full-size function keys, an 80 by 25 LCD screen with supertwist crys-

als, an 8086 processor running at 8 MHz, 256K bytes of RAM, 256K bytes of ROM with a built-in word processor and communications program, and a built-in 1,200-bps modem. All for \$500.

Built by a high-volume manufacturer with surface-mount assembly techniques, this computer would be entirely possible to make and sell today.

**LACK OF GUTS** The problem isn't with the original vision of a peripheral computer. The problem is with a lack of guts on the part of Tandy and the other manufacturers (including NEC, which makes a computer similar to the Model 100).

Tandy, for instance, decided to upgrade the Model 100 last summer, so it introduced the Model 102. What a disappointment! Instead of bringing the machine up to date, Tandy wimped out. All it did was make the computer a little thinner and lighter and the function and cursor keys slightly bigger. Same processor. Same display. Same memory. Same price.

Why didn't Tandy go further? Same old wimpy answer that every big company gives: compatibility. Tandy didn't want to introduce an upgrade that might be incompatible with the existing software and add-ons (for the Model 100, not the IBM PC). What the company really means is that it didn't want to disturb its product line. Since introducing the Tandy Model 100, the company has introduced two other laptop computers, the Models 200 and 600. Both are significantly heavier, more expensive, and less attractive than the Model 100. Both, for instance, feature flip-up screens: anyone who travels in coach seats knows that flip-up screens don't always flip all the way up when the person in front of you puts his seat back all the way.

And the real kicker is that compatibility is meaningless in a true laptop. The Model 100 itself isn't compatible with anything. Most of its add-ons are for adding RAM that could be built in and programs that could be in a larger ROM. A good laptop needs to be able to communicate with the desktop computer just like a disk drive, so that the laptop doesn't need disk drives itself.

The Model 102 is just too bad, because Tandy has missed a major opportunity to bring a lot of loyal customers back into its store for an upgrade. And Tandy also missed an opportunity to put a hammerlock on the market for laptops, while at the same time defining the nature of the true laptop computer.

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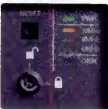
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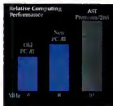
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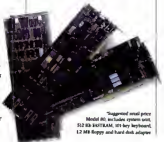
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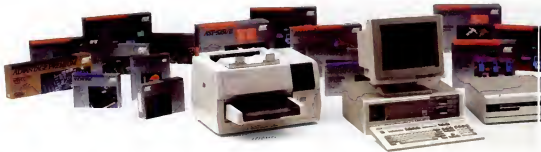
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# DATABASE POWER PUTS ON AN EASY INTERFACE

*Manufacturers of complex database managers are enhancing their products with stronger user interfaces, making power easier to access. Conversely, easy database managers are trying to handle more-complex tasks. The result is that both ends of the spectrum have wider user appeal.*



One of the earliest reasons why people wanted personal computers was to handle large quantities of similar data. Software producers met this need with a host of data management programs ranging from the simple and straightforward to the outrageously complex (see Project Database II, *PC Magazine*, Volume 5 Numbers 12, 13, and 14).

Traditionally, personal computer users had to choose between packages that were either easy to use or powerful. You couldn't get both in a single program. In recent years, however, publishers of the once simple programs have been adding features that let their programs handle more-complex tasks. And publishers of the more-complex, more-difficult packages have been redesigning the user interface to make the power easier to access. Consequently, the ends of the curve shown in the accompanying graph are converging toward the middle, which indicates that both the pow-



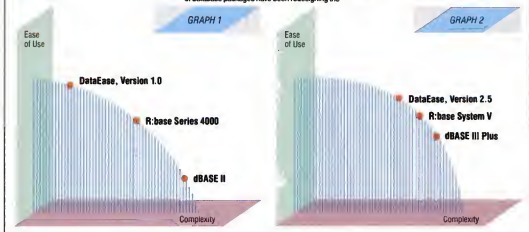
## ■ HIGH-END DATABASES



### Power Made Easy

**G**raph 1 illustrates how, traditionally, personal computer users had a choice between database managers that were easy to use or those that were powerful. You couldn't get both in a single program. In recent years, however, the publishers of database packages have been redesigning the

user interface to make more power easier to access. Graph 2 illustrates how product redesigns have raised both the available power for data management and the standards for ease of use for this class of program.



er available for data management and the standards for ease of use are rising.

*DataEase*, *dBASE III Plus*, and *R:base System V* fall into the high-end category: they have tremendous power but considerable complexity. However, the newest versions of these programs take varied paths to the same upper-right-hand corner of the ease-of-use/performance graph.

*DataEase* started out as a menu-driven program that had a limited ability to connect different tables. *R:base 4000* could handle only a single table at a time but had powerful commands that let you combine related tables to create larger ones. It had a limited prompting system, and you could do most of your work from a command prompt. *dBASE II* (born as *Vulcan*) is the graybeard of the trio; it established the standard for cryptic documentation and unresponsive user-interface design. All you got was a cursor blinking next to a period. If you were going to get anything out of this program, you had to learn how to issue the commands at the command prompt or through procedure files. Initially, working with *dBASE II* was scarcely different from programming in BASIC or COBOL.

As the market matured, user demands have changed—these changes have shaped all three products. Each has gone through at least one major revision. *DataEase* now has some limited procedure-file capabilities. *R:base System V* has powerful generator utilities, more-extensive menus, and the ability to link tables without combining them into a single table. *dBASE III Plus* borrowed a few pages from its stablemate, *Framework*, and now has pull-down menus and pop-up windows, plus a host of other features that make it easier to use.

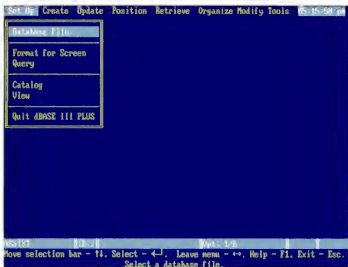
Our new evaluation of these three products—all Editor's Choices from Project Database—includes a run-through of the Project Database standard timing tasks, as well as a look at these programs' ease of use, power, and standard features. Bear in mind that different factors will carry different weight depending on the needs of your application.

Does it make any difference to you whether you're adding power to ease of use, or the other way around? Which one is most likely to succeed as you're working on your database tasks?

**INSTALLATION** *DataEase* is by far the easiest program to install. It is not copy protected, so to set it up on a hard disk you simply copy the disks into a subdirectory. It consists of only three disks, including tutorial. System configuration options are available, but you set them in each database that you create and do not need to change the defaults to get started. *DataEase* is also the easiest of the three to run on a dual floppy disk system.

*R:base System V* is not copy protected either, making it relatively easy to run from your hard disk. But forget trying to use it on a floppy disk drive system: the 11 disks that make up the full system require a whopping 4 megabytes of storage! This one is definitely marked "hard disk required." Aside from modifying your CONFIG.SYS file (which is handled automatically), no configuration is required once the programs are loaded. You just issue the RBSYSTEM command and you're ready to run.

Despite Ashton-Tate's recent announcements about removing copy protection from its products, the review copy of *dBASE III Plus* arrived with the familiar



The dBASE Assist in dBASE III Plus now uses pull-down menus like those in Framework. The screen above shows what you now see at the start of a dBASE session—quite a contrast to the dot prompt in the original version.

copy protection. If you are willing to use it with a key disk, installation is straightforward: just copy the five disks to a hard disk. Aside from adjusting your CONFIG.SYS file (which you must do manually), no other installation is required unless you want to change default environment settings. I hope Ashton-Tate starts shipping the unprotected version soon because I dislike key disks and the problems caused by using the install option offered with the program. (Any system that will destroy data on your hard disk when you perform a task as essential as BACKUP is an unjustifiable hazard, in my opinion.)

**DOCUMENTATION** Database management programs are notorious for drawing criticism about the quality of their documentation. It should be said in their defense that the documentation must respond to the needs of a wide range of users while explaining complex concepts and commands. Manuals must meet the needs of beginners who may have had no computer experience at all or may have had considerable database experience—but with other programs. At the same time, the manuals must serve as a reference both for

the user who wants to work with the program on an interactive level and for the programmer who wants to create a complex customized application.

All three programs show how far the industry has come since the days of the mimeographed *dBASE II* manual. But no doubt some users will still find fault with the documentation. Consequently, you can expect to find how-to books on these products at your local bookstore to supplement the information in the manuals.

*DataEase* is the lightweight of the three in the documentation category, with only about 400 pages. The manual comes in one binder, which contains separate tutorial and quick-reference guides. The reference section is linear: it starts with the first menu option, goes through all its suboptions until all levels are covered, then goes on to the next selection in the menu. This sometimes makes it difficult to find information about a topic, but it works as an effective guide while you use the program. The tutorial is also effective: it covers most of the important points in a short time.

The documentation strategy behind *R:base System V* appears to be "divide and conquer." It includes three wire-bound

■ As you might suspect from looking at the documentation, *DataEase* has the fewest programming commands of the three products.

manuals: learning guide, user's manual, and building applications/command dictionary. Besides these, five smaller booklets cover a command summary, single and multiuser installation, a "Read Me," and error messages. Altogether, the documentation consists of more than 900 pages. You have to wonder about a program that requires a separate 70-page manual for error messages—and then gives you an error message that isn't listed.

The tutorial starts with the same Microrim lessons on database design from *R:base Series 5000*, which serves as an excellent introduction to some complex concepts. The tutorial is a bit long, but it is thorough, and the reference sections have a variety of examples of most commands.

*dBASE III Plus* makes up for the shortcomings of *dBASE II* with more than 1,000 pages of documentation. It consists of five manuals in two binders: tutorial, command and function reference, programmer's guide, networking, and run time. Also supplied are separate booklets devoted to: a quick reference guide, getting started, and the applications generator. The style is dense but manageable; the manuals are fairly well indexed, but for best results you should search for the command you want, not the function it serves. For example, search for Modify Command instead of *dBASE* word processor. The tutorial offers helpful exercises that illustrate the concepts and commands, and the reference sections provide numerous examples.

**MENU STRUCTURE** All three programs have extensive menu-driven front-ends to make it easy for you to gain access

## ■ HIGH-END DATABASES



### High-End Databases: Summary of Features



Product		DataEase	dBASE III Plus	R-base System V
<b>List Price</b>		\$690	\$695	\$705
<b>File Structures/Limits</b>	Number of fields per record	255	128	400
	Record size (bytes)	4,000	4,000	4,096
	Number of records per data file	65,535	1 billion	Unlimited
	Number of records per database	65,890	10 billion	Unlimited
	Field size (bytes)	255	254	4,092
<b>Data Types and Size</b>	Numeric	●	●	1,500
	Money	●	●	●
	Logical (Boolean)	●	●	●
	Long text	○	○	●
<b>Data Entry and Editing</b>	Range testing	●	○	●
	Default values	●	○	●
	Requires specific values	●	○	●
	Lookup to external data tables	●	○	●
	Double-entry verification	○	○	●
	Required fields	●	○	●
	Multi fill field	○	○	○
	Forced uppercase	●	○	○
	Automatic incrementing fields	○	○	○
	Unique fields	●	○	○
	Automatic data entry	○	○	○
<b>Data Import/Export</b>	DBF	Imp/Exp	Imp/Exp	Imp/Exp
	PPS	○	Imp/Exp	Imp/Exp
	SDF	Imp/Exp	Imp/Exp	Imp/Exp
	SYLK	Imp/Exp	Imp/Exp	Imp/Exp
	WKS	Imp/Exp	Imp/Exp	Imp/Exp
<b>Data Manipulation</b>	Number of index files	Unlimited	Unlimited	400
	Compound indexes	○	●	○
	Sorting	○	○	○
	Number of sort fields	infinite	100 characters	None
	Ascending order	●	○	○
	Descending order	○	○	○
	Maximum number of open files	255	10	80
	Maximum number of tables merged	40	2	2
<b>Command Strategy</b>	Menu type	Vertical	○	●
	Horizontal bar	●	○	○
	Pop-up windows	○	○	○
	Typed commands	○	○	○
	Whole words	○	○	○
	Abbreviations	○	○	○
<b>Disk Requirements</b>	Floppy disk	●	●	○
	Hard disk	○	○	○
	Kbytes occupied by program files	400	500 (approx.)	4,000
	Number of distribution disks: total	3	7	11
	Number required to run program	2	2	10
<b>Input Facilities</b>	Screen definition: Automatic	○	●	●
	Programming	○	○	○
	Number of screens per file	16	Unlimited	Unlimited
	Number of lines per screen	40	10	80
	Prompt messages for fields	○	○	○
<b>Output Facilities</b>	Report generation: Statistical functions	●	○	○
	Report definition methods: Printing	○	○	○
	Form layout	○	○	○
	Automatic	○	○	○
	Progressing	○	○	○
	Footers	○	○	○
	Printer setup facility	○	○	○
<b>Special Features</b>	Access from another directory	○	○	○
	Macros	○	○	○
	Customize keyboard	○	○	○
	Data encryption	○	○	○
	Network support	○	○	○
	High-level language interface	○	Pascal and C optional	Optional

□ Indicates Editor's Choice. ●—Yes ○—No \*Network support is about to be announced. †At extra cost.

DataEase, R-base System V, and dBASE III Plus share a number of characteristics. All three handle character, floating-point, and date and time data. For input, all three can define the screen by pointing, but none handle coordinate specification. In data entry, all do data conversion, calculate on the entry screen, and carry over data from the previous record. All three can import and export ASCII files. All three index, and the index values need not be unique. They can all resequency file definitions, delete and update multiple records, do math and text updates, and merge tables. In report generation, each of the databases does both arithmetic and aggregate functions as well as multiple-line reports, and each has predefined mailing labels. In report definition methods, all have stored report definitions and headers; each can output to printer, screen, or disk. In query facilities, the three databases share the following: all have a query language, multiple-file access, and stored queries. None of the programs can use a mouse or other alternative device. All three packages offer DOS 2.0 or later directory support, change the default database directory, customize a color screen, and offer user-access security provisions; none support the Above Board. None of the programs are copy protected. All have on-line help, reference documentation, and a written tutorial, but none have an on-screen, audio-tape or video-tape tutorial.

to their complex features. Each takes a different approach, and each has its pluses and minuses.

DataEase is entirely menu driven, except for writing some free-form query procedures. In many instances, if you do not know the name of a field or file you want to use, you can call up a window that presents a numbered list of choices. A small inconsistency crops up here: on most menus, you do not have to press Enter after typing the number of your selection, but on windowed lists, you are required to press Enter in order to confirm your selection. On the other hand, all menus let you either type the number of the choice or move a highlighted bar to your selection.

One of the problems with *R-base Series 5000's* prompt system was that it was only a guide and did little to protect you from mistakes. It was entirely possible to fill in the blanks with plausible answers and still end up with a syntax error message for your trouble. *R-base System V* solves this problem by letting you select only valid responses each step of the way. Once you have created your command with the aid of the prompts, you are given the option of editing it before you execute it. Of the three programs, this is perhaps the most flexible yet foolproof arrangement.

Assist has grown up since it first appeared in *dBASE III*. In *dBASE III Plus*, you select options from a list of pull-down or pop-up windows, and you have access to nearly every feature in the *dBASE III* system. My only complaint is that some situations require you to answer all the questions presented in a window, but this is not made clear. You could make an incomplete request. Overall, however, the menus are a major improvement over earlier versions, since you can now define multiple-table relations through menus instead of using the cumbersome Set Relation To programming.

**OVERRIDING THE MENUS** One of the problems with menus is that sometimes they just get in the way, especially once you know your way around the programming language. In *DataEase*, the only way to override the existing menus is to create custom ones or to toggle off the interactive mode in the Query definition. In either case, your escape is only temporary; most



## FACT FILE



**R-base System V**  
Microm  
3925 159th Ave. NE  
P.O. Box 97022  
Redmond, WA 98073-  
9722  
(206) 885-2000  
List Price: \$700

Requires: 512K RAM, hard disk, DOS 2.0 or later.

**In Short:** System V advances beyond R-base Series 5000's already impressive menu-driven facilities to make it easy for less-experienced users to gain access to its powerful features. Standout details include its menu generator and the ease with which tables can be related. Unfortunately, its performance is somewhat slower than that of the other two packages. Not copy protected.

CIRCLE 690 ON READER SERVICE CARD



**DataEase, Version 2.5**  
Release 2  
Software Solutions Inc.  
12 Cambridge Dr.  
Trumbull, CT 06611  
(800) 243-5123  
(203) 374-8000  
List Price: \$600

Requires: 384K RAM, two floppy disk drives, DOS 2.0 or later.

**In Short:** This menu-driven program has a limited programming language but can still be used to create complex custom applications if you are willing to accept some of the constraints of the user interface. Not copy protected.

CIRCLE 691 ON READER SERVICE CARD



**dBASE III Plus,**  
Version 1.0  
Ashton-Tate  
20101 Hamilton Ave.  
Torrance, CA 90502-  
8000  
(213) 329-8000  
List Price: \$695

Requires: 256K RAM, two floppy disk drives, DOS 2.0 or later.

**In Short:** dBASE has long been known for its power and flexibility; applications developers often choose it when building complex custom applications. dBASE III Plus makes this power more accessible to the new user through a new series of menu-driven facilities. Its main drawback is that you need to resort to writing your own procedure files to get even moderately complex reports. Not copy protected.

CIRCLE 689 ON READER SERVICE CARD

of the time you'll be working your way through the menus.

**R-base System V** comes up in the prompt mode, asking you to select a database. At that point, you can press the Esc key twice to get to the command level, indicated by an R> prompt. To return to the menu-driven mode, simply type the command Prompt. If you need help only with the syntax for a rarely used command, you may type "PROMPT command," when command is the one you want to use. R-base System V will take you directly to that portion of the menu system and return you to the R> prompt when you are finished.

**dBASE III Plus** allows you to override the menu structure, too. When you first load the program, you find Assist waiting for you, as well as a status line that shows which file is in use, and other helpful information. There's more than one way to override Assist: press Esc or alter the CONFIG.DB file to bring up a clear screen when you load the program. Its default settings are Assist On and Status On, but by removing these lines, you can avoid Assist entirely. You may also return to the menus by typing Assist at any dot prompt.

**PROGRAMMABILITY** As you might suspect from looking at the lists in the *DataEase* documentation, this product has the fewest programming commands of the three. It includes only 11 commands, has 50 different functions, and no compiler. While it is not as powerful as the other two, many of the commands and functions found in *dBASE* and *System V* are built into the table definition screens and other configuration options in *DataEase*. The environment is fairly inflexible, but you can do just about anything that you want to do—provided you are willing to work *DataEase*'s way, not yours.

**R-base System V** falls in the middle again, with 89 commands and 70 functions. It has a command file processor, called Codelock, that is designed primarily to encrypt your procedure files. It apparently is not a full-blown compiler, since the documentation goes on to point out that it "may reduce the execution time." The *System V* procedure language takes some getting used to. For instance, record pointers do not come automatically with each table. Instead, you only get three pointers at a time, no matter how many tables you are using.

Prompts are organized under these topics.  
For a list of commands that have prompts, choose All commands.

To leave PROMPTS for R:BASE command mode, press [ESC].

Data Manipulation	Database Operations	Utilities
Look at data	Open a database	Application development
Print data	Exit	Database maintenance
Add data	Data input	R:BASE environment
Edit data	Data output	Edit an ASCII file
Import/export data	Create a database	DOS functions
Relational operations	Modify a database	All commands

The R-base System V Prompt mode gives easy access to most of the R-base commands. If you cannot find the function you want on this list, you can call up a full screen showing all the commands.

## ■ HIGH-END DATABASES

■ *dBASE III Plus* adds new features to make programming easier, including memory files that let you initialize and restore variables with a single command.

*dBASE III Plus* wins the command race hands down with a whopping 153 commands and 70 functions. With that many switches and options, it's not at all surprising that there are so many books on the stands explaining how to use the program. *dBASE III Plus* also comes with a compiler called Runtime+, which encrypts your code and speeds up performance. You still need a copy of *dBASE III Plus* (or dBRUN) to execute your files, and not all *dBASE III Plus* code is compatible with the Runtime+ compiler. You don't need to buy any additional packages to compile your code. *Plus* adds other features to make programming easier, including memory files that let you initialize and restore variables with a single command, the Set Fields command that limits the fields that will be used by List and other commands, the ability to load and call .COM files from within a procedure, and an immediate If function that only requires a single line. It also includes a set of new features that makes debugging procedure files faster and more efficient to use.

**PROGRAM EDITOR** The editor in *DataEase* is either simplistic—or a complex code generator, depending on your viewpoint. The editor consists of two levels, which can be tricky to grasp and manage at first. In the interactive mode, you can create even the most complex queries entirely from menus, which eliminates most syntax errors. In the edit mode you are on your own. You may use block cut, paste, and copy functions, but that is about

```
FORM person
Please hit Enter, Delete or Modify key
Field name : Department Name
Field type : Text
Maximum length of field : 16
Press ENTER, MODIFY or DELETE any time to skip the remaining questions
Is this field REQUIRED to be entered? : NO
Does this field require fast (INDEXED) access? : NO
Is it one of the UNIQUE fields? : NO
Does the field require a RANGE CHECK? : NO
Is the field DERIVED (calculate/lookup/sequence/default)? : yes
Field derivation formula : lookupt deyt "Name"
PREVENT data-entry in the field? : yes, and do not save (virtual)
Minimum Security Level to View the Field:
Minimum Security Level to Write the Field:
Field Help
Field display attribute:
```

F2 ENTER F7 DELETE F8 MODIFY

The *DataEase* field definition screen shows all the different options available for a field. You do not have to fill out each option, as indicated in this example; you can end the field definition process as soon as you have answered the first few questions.

the limit to its features. *System V* uses an editor called RbEdit, which can handle text files up to about 800 lines in length. If you need to work with bigger files, you must use your own editor outside of *System V*. RbEdit has block functions but no search or replace. It does have one nice feature; you can insert any ASCII code above 31 using the Alt key and the numeric keypad, then use the F4 function key to repeat it anywhere you want.

*Plus* vastly improves the original *dBASE III* editor, with the addition of a help screen that shows most of the available commands. It also now has a few more functions, such as search, but still no replace or block commands. You are limited to 5,000 characters per file, but if you want more power or capacity you can install your own favorite editor in its place through the CONFIG.DB file.

**CUSTOM MENU OPTIONS** All three programs have custom menu-generating facilities, which are useful if you are designing complex systems to be used by less-sophisticated users. They can also be timesavers if you have a set of routine operations that you must execute regularly.

*DataEase* lets you create vertical menus with numbered options. You build menus from the different types of actions that can be taken, which are limited to the choices you would make from the regular system menus. The process is nothing like creating a command file, since there is a limit to how much you can automate the normally interactive process.

You can create vertical or horizontal menus with *System V* in the Applications Express module. This generates program code for the menus that you can modify with the RbEdit editor. You can also use a menu command in procedure files without going through Applications Express, making it relatively easy to create menus in your own programs.

*dBASE III Plus* will also generate menus through its applications generator. They come only in vertical format with numbered options, and you can edit the generated code with the editor.

**ENVIRONMENT FLEXIBILITY** As mentioned, *DataEase* is inflexible in terms of letting you define the operating environment. The exceptions to this are screen and printer settings. You can assign screen



Edit: D-test.prg

CURSOR: <-->		UP	DOWN
Char: + +	Line: ↑ ↓	DELETE	Insert Mode: ^Ins
Word: Home End	Page: PgUp PgDn	Char: Del	Insert Line: ^N
Line: ^_ ^_	Find: ^F	Word: ^T	Save: ^W Abort: Esc
Reformat: ^R	RefInd: ^XL	Line: ^Y	Read File: ^OR
			Write File: ^IV

```
SET TALK OFF
SET BELL OFF
SET STATUS ON
SET ESCAPE OFF
SET CONFIRM ON
SET COLOR TO GR/B,U/W,B
USE ACCOUNTS INDEX LAST

DO WHILE .T.
    * ---Display menu options, centered on the screen.
    * draw menu border and print heading
    CLEAR
    @ 2, @ 2 TO 14,79 DOUBLE
    @ 3,22 SAY [A C C O U N T S   M A I N   M E N U]
```

The dBASE word processor has a new look, including a menu of available commands. The code being edited on this screen was created using the Applications Generator.

settings for each user individually, if you have a lot of people working on the same computer and if they care violently about the colors on their screens. More useful is the printer support; you have access to spe-

cial printer features such as pitch, font, and underlining, and you can create your own printer tables if your printer is not one of the many supported already. Also, multiple levels of security are available, which

R 4 C 19

Specify the items to be listed.

Select any ordering, grouping, or group-totals for this item?

1: NONE 2: in order 3: in reverse 4: in groups 5: in groups with group-totals

for person

list records

Department Code in groups with group-totals ;

Department Name ;

Employee Number: item ;

Last in order: item ;

Salary : item sum ;

"A"="A" : count ;

current page number .

F1 MORE F4EXIT F9LEVEL QUERY LEVEL Low MODE Interactive

This example of a DataEase query illustrates the Interactive mode; note the list of choices in the bar above the query code. You can develop complex queries simply by responding to menu choices.

give you a high degree of control over who can see what's in your files.

System V provides limited control over the operating environment through some of its commands. The manuals also tell you how you can modify certain files in the system to change the standard messages and menus with the system. It has only two levels of security.

The most pliable environment belongs to dBASE III Plus, including control over field delimiters, printer port redirection, and date formats. The program has no security features built in, but you can encrypt your procedure code and bury your own password protection system in that.

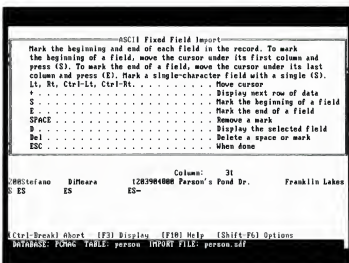
**SPECIAL FEATURES** All three programs have some clever details that set them apart from one another. In many cases, they may just seem to be attractive trimmings, but you may find one or two that could have a major impact on how you plan to use the package.

DataEase's best feature is the interactive query editor, which makes it easy to create complex queries and difficult to make a mistake. Another powerful addition is its MultiView key, which allows you to view related records in other tables. The "long text" field type is also worthy of mention. Unlike dBASE's, it requires no special keystroke to use, and it includes word wrap, paragraph breaks, and insert and delete line functions.

When it comes to System V, its various Express modules make it shine. These automate the process of creating tables, reports, and entry screens. One interesting feature of table definition is you can define "rules" that serve as entry edit masks for data entry. These are especially easy to create, given their power, and go a long way toward improving the accuracy of entered data. The File Gateway utility is the same as R-base 5000's, and still is one of the slickest and fastest ways to import data into a database.

It will come as no surprise to anyone that dBASE III Plus holds its own in this area. As mentioned, Assist now gives you comprehensive access to the full range of the program's features. Appsgen, the applications generator, seems to do a fair job of generating code for menus and simple applications. The new History function

## ■ HIGH-END DATABASES



The FileGateway module in R-base System V makes short work of preparing fixed-length records for import into R-base tables. The import process is a little slower than the competition, but this is more than compensated for by the ease with which you define the import process. For example, you can see on actual record from the import file, as illustrated in this screen shot.

makes interactive work a dream: you can recall and execute your prior commands without retyping them.

**PACK PROCEDURE** With some simple database programs, deleting a record means it's gone and its disk space is recovered. That is not the case with the more powerful programs; you usually have to pack the tables explicitly to recover space used by deleted records. This feature be-

comes more important if your application uses numerous transactions that create and delete lots of records. You need to be able to automate this function in order to operate smoothly.

Of the three programs, *DataEase* makes the pack process the most difficult. You must go through the special backup and restore procedure provided, and, to make matters worse, this procedure acts on the entire database at once, meaning that

■ Like *DataEase*, *R-base System V* also must pack all the files in the database at once, instead of letting you specify a single table.

you must back up all tables and related files, not just the one table you might need to pack.

Like *DataEase*, *System V* also must pack all the files in the database at once, instead of letting you specify a single table. Fortunately, it combines the backup and restore operations into a single step, but an additional risk comes with this advantage. The program recommends (and warns) you to back up the files before you run Pack. Although I did not lose any files when using Pack in *System V*, I have lost tables while doing the same with *R-base 5000*. Pack also rebuilds all your index files at the same time, so this can be quite a lengthy process.

*dBASE III Plus* is the leader in this category because you can pack a single table at any time. If any indexes are active at the time, they are rebuilt after the Pack procedure. You can control which tables are packed and when, and that can make maintenance of your files more efficient.

**PERFORMANCE** Ease of use does not count for much if you have to wait eons for your results or spend eons setting up your procedures. To test the programs, we ran them through Project Database II benchmark tests, which involved finding records and printing reports. To make the test more taxing, we tried to see how far each program could get on the standard report format using just the menu-driven features available.

After all we've just said about *DataEase*'s fewer features and rigid structure, its test performance may surprise you; it fared extremely well. It was the



### Performance Tests: High-End Databases

Our high-end database performance tests measured performance in common database tasks, such as searching and indexing. We timed the performance of each program using a 500-record file. The results clearly show that *dBASE III Plus* is the fastest of the three high-end databases.

(Times given in seconds)	<i>DataEase</i>	<i>R-base System V</i>	<i>dBASE III Plus</i>
Index 500 records	30	43	10
Retrieve 1 of 500 records without index	4	4	4
Retrieve 1 of 500 records with index	<1	3	<1
Execute 500-record report	250	545	170

fastest or tied for first in speed of creating a report, as well as in finding a single record with and without indexes. It performed acceptably in the report speed and the index test. Perhaps the most significant point is that it was the only program of the three that could meet all the report format specifications with its menu-based system. The other two require significant programming to get the same results. It has a flexible report generator, which makes it most likely to be faster for developing most reports.

*System V* was disappointingly slow. It usually came in last, and in spite of the use of indexes the report still took more than three times as long as *dBASE* and twice as long as *DataEase* to produce. (The indexes cut the report time to less than half of the time without indexes.) The different Express modules are large, so even with a fast hard disk, the wait is quite noticeable as you switch from one to the other.

*dBASE III Plus* was clearly a winner in the speed race. It was three times faster on the indexing than the others, and was fastest or tied with the others in every category except speed of report development. That was because it took some extra time to work out what the View files could and could not do to link multiple tables. The report generator makes fast code, and *dBASE* should be considered if your reporting needs can be handled in this way, without programming.

Unfortunately, *dBASE* was least well equipped to meet the report specs with its report generator, and you will lose some speed in both development and execution if you have to rely on procedure files.

**CONCLUSION** Since their separate revisions, each product has maintained its own distinctive character, but overall, *dBASE III Plus* is the winner (see Editor's Choice).

*DataEase* is the product of choice if you are looking for access to power—without becoming a master programmer. It is fast and complex, but you can get at all of that through its many-faceted menus. The main concern is: Make sure your needs will mesh with the limits it places on your system design.

*System V* is slow, and the programming features are limited in some unlikely places, but you do gain access to multiple

## PC EDITOR'S CHOICE

*Picking a winner here is much like choosing the Most Valuable Player in a major-league championship game; all three programs are winners. Each was an Editor's Choice in the last Project Database II review, and we found nothing to change that in this review. If you must pick one over the other three, then the nod must go to dBASE III Plus. It is adequate in terms of its menu-driven features and program generator, and it excels in flexibility and power. It also has a great range of support from other vendors in terms of add-on utilities, books, and ready-to-run (and modify) applications. dBASE III Plus is a program that novices can use without too much trouble for simple tasks and that users will not soon outgrow as needs change.*

file links and fairly complex reports through the different Express modules. It is also the only package that comes ready-to-run for multiuser service on a local network, which can be a considerable cost-savings if you need that feature.

*dBASE III Plus* remains the programmer's choice. The new Assist features do give you more access to the different aspects of the program, but you will still need to get into procedure files to take full advantage of *dBASE*'s power and functions. Select *dBASE* for speed and power, but do it with the understanding that someday you will leave the friendly confines of Assist and face the dot prompt and command files.

In sum, all three programs have helped push the ease-of-use/complexity curve further up and to the right. Database users can benefit from their progress, but as with most achievements, the advances also reveal that we haven't yet reached the end of the line. [E]

Alfred Poor is a frequent contributor to PC Magazine.

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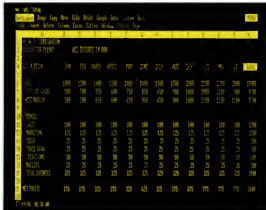
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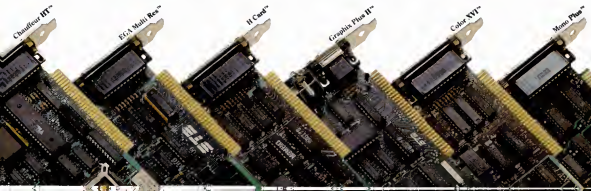
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# FILE MANAGERS

## Get A Face-lift

*The latest versions of Q&A and PowerBase are top-notch databases—both are much improved over their early releases. PFS:Professional File, a combination of PFS:File and PFS:Report, adds new features and is also a worthy competitor in the file-manager category.*

■ ■ ■ ■ ■ ■ ■ ■ ■ ■

**L**ike fine wines that improve with age, the three file/database managers reviewed here—PFS:Professional File, Q&A, and PowerBase—are all better now than when they were first introduced. The traditional trade-off between power and ease-of-use is less an issue today than it was with the early database managers for the PC. In all three cases the manufacturers have added features that make their products more powerful without drastically steepening the learning curve.

The recently released PFS:Professional File combines the well-known PFS:File and PFS:Report and adds new features such as pull-down menus and crosstab reports. Q&A, Version 2.0, is faster than its earlier version (an Editor's Choice in Project Database II, PC Magazine, Volume 5 Number 14) and now accepts programming statements in field specifications. PowerBase, Version 2.3, enhances the previous version (a Project Database II Editor's

■ ■ ■ ■ ■ ■ ■ ■ ■ ■

## ■ LOW-END DATABASES

Choice in Volume 5 Number 12) with more-extensive report-generation capabilities.

### ■ PFS:Professional File

Like the old soldier who never dies, Software Publishing's *PFS:File* remains alive and well under a new guise, *PFS:Professional File*. This new version of the old standard is still easy to use but now includes powerful new features such as crosstab reports and macros. *PFS:Professional File*, which sells for \$249, is actually an upgrade of two of Software Publishing's greatest hits, *PFS:File* and *PFS:Report*, and is part of the company's new Professional line that includes *Professional Write*, *Plan*, and *Network*.

*PFS:Professional File* is a cinch to get up and running. You copy the files on the unprotected master disk to your hard disk, or for a dual-floppy configuration you can make a copy of the master. Typing PF at the C> (or A>) prompt brings up the opening menu, a jazzed up version of the one used by *PFS:File*. Next, you choose Setup to input information about your particular system configuration.

To use the program, choose Design from the opening menu. An overlapping submenu appears with four choices. If you choose Create New Design, a third overlapping window appears, which prompts you for the filename. Once you have entered it, a screen very similar to the original *PFS* program's appears.



## FACT FILE



**PFS:Professional File**  
Software Publishing Corp.  
1901 Landings Dr.  
Mountain View, CA 94043  
(415) 962-8910  
List Price: \$249

Requires: 256K RAM, two disk drives, DOS 2.0 or later (DOS 3.2 requires an additional 64K).

In Short: An easy-to-use file manager that stands out for its ability to do crosstab reports. Not copy protected.

CIRCLE 666 ON READER SERVICE CARD

### List Options

Header 1:

Header 2:

Footer 1:

Footer 2: Page #1\*

Print summaries only (Y/N): N

Double space list (Y/N): N

Page length : 66

Page width : 88

Number of copies: 1

Print to:

1. Printer

2. Screen

3. Disk

Enter options for printing list

ESC=Cancel

F1=Help

\* \* \* 12/28/1986

Reports are created in PFS:Professional File by using this options list.

### Total Units Booked

#### Sales Rep

Product Name	Jim Williams	Lisa Clayton	Marc Bailey	Total
Answering System 2800	658	1,258	1,958	3,858
Answering System 258	1,988	2,888	2,268	6,168
Answering System 3800	1,175	1,475	1,325	3,975
Cellular Phone DX68	38		18	48
Cellular Phone LX95	28		18	38
Cellular Phone XT28	58	188	188	258
Cordless Phone 1888	2,888	4,728	5,688	12,328
Cordless Phone 2888	2,458	2,888		4,458
Cordless Phone 4888	588	2,888	4,888	7,388
Key Telephone 4888	1,888	925	2,558	4,475
Key Telephone 5888	258	1,958		2,208

PAUSE

Preview report.

ESC=End report

F1=Help

F4=Next page

Crosstab reports can be done with ease in PFS:Professional File.

At the bottom is a ruler to help in the placement of field names. At the top is a menu bar with four choices, Help, Edit, Form, and Quick Entry, keyed to function keys F1, F2, F3, and F4. Pressing any except F1 brings a pull-down menu onto the

screen (these can also be selected with a Ctrl-key combination). F1 brings up context-sensitive help in a window.

Designing the file follows exactly the same procedure as *PFS:File*; anywhere on the screen, you type field names followed

by a colon. Pressing PgDn brings you to a second page, if necessary (a file can be up to 32 pages long), pressing F10 stores the design and brings you back to the menu.

## PROFESSIONAL PERFORMANCE

To evaluate performance, I imported a 25-record file from 1-2-3 into *PFS:Professional File*. The process is as simple as choosing Copy from the main menu and the "Copy from 1-2-3 worksheet" option from the Copy menu. This took 18.1 seconds; sorting the records took about 3 seconds; and searching for one record took 1.3 seconds.

Next, I repeated the test with a 500-record file to see if times increased proportionately. Importing the file certainly did: 5 minutes and 19 seconds. However, it took only 2.4 seconds to search for a record. This time decreased with subsequent searches because *File* uses a disk-caching algorithm to load frequently used records into memory. The same search that took 2.4 seconds on the first try took 2.0 seconds on the third try.

Preparing a report from the file I'd created was, like everything else in this program, a simple task. When you choose the Report option from the main menu, a Report menu appears. If you want a standard report, you choose List. Then a blank-form design appears. You then enter a number next to the field names to specify the order that they will appear on the report. Once this is done, another blank record appears on which you can enter conditions such as >35000 next to a field name such as salary.

After any conditions are entered, an option list appears that lets you, among other things, add headers and footers to the report and specify printer, screen, or disk as the report destination. The sample report took about 1 minute to define and 7 seconds to output to the screen.

As another test, I redesigned the file by switching the positions of two fields on the input form; it took 18 seconds to incorporate the change in the 25-record file.

## FILE FEATURES

In the file-management part of the program such features as ditto fields and calculated fields ease the data entry task. Attachment pages let you add information not included in your origi-



## Low-End Databases: Summary of Features

Product	PFS: Professional File	Powerbase	Q&A
List Price	\$249	\$249	\$349
File Structures Limits			
Number of fields per record	3,200	64	2,400
Record size (bytes)	\$1,000	1,600	1,700
Number of records per data file	25,500	85,534	16 million
Number of files per database	64	N/A	N/A
Field size (bytes)	1,919	80	1,878
Data Types			
Money	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Logical (Boolean)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Date	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Data Entry and Editing			
Range testing	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Default values	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Requires specific values	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Lookup to external data tables	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Double-entry verification	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Required fields	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Must fill field	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Forced uppercase	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Date conversions	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Automatic incrementing fields	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Unique fields	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Automatic data entry	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Data Import/Export			
DIF	<input type="checkbox"/>	Imp-Exp	Imp-Exp
DBF	<input type="checkbox"/>	Imp-Exp	Imp-Exp
SOI	<input type="checkbox"/>	Imp-Exp	Imp-Exp
STYL	<input type="checkbox"/>	Imp-Exp	Imp-Exp
User defined	<input type="checkbox"/>	Imp-Exp	Exp
Data Manipulation			
Indexing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Number of index files	1	6	115
Can specify indexed field(s)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Sorting	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Number of sort fields	64	10	512
Maximum number of open files	1	1	1
Table merging (join)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Maximum number of tables merged	None	2	None
Command Strategy			
Menu type: Vertical	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Horizontal bar	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Push-down	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Pop-up windows	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Menu selection: Function keys	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Point and shoot	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Specified single key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Disk Requirements			
Kbytes occupied by program files	210	1,200	200
Number of distribution disks:			
Total	1	5	6
Number required to run program	1	4	4
Support Materials			
Tutorial: On-screen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Manual/sample files	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Input Facilities			
Number of screens per file	32	1	10
Number of files per screen	1	1	1
Output Facilities			
Report generation: Aggregate functions	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Multiple file reports	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Prefilled mailing labels	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Special Features			
Query language	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Macros	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Customize color screen	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Password protection	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Network support	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Above Board support	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Indicates Editor's Choice. ☒—Yes ☐—No N/A—Not applicable \*Lookup tables are within the file.  
 †The first field is automatically indexed. ‡Files are automatically sorted by primary index; otherwise sorting can be done only when creating reports. §Label generation is done in conjunction with Q&A word processor ¶Through PFS: Professional Network

Q&A, Powerbase, and PFS: Professional File share many characteristics. All have character and numeric data. For data entry, all have calculated fields and can carry over data from a previous record. All can import and export ASCII, PFS: File, and WKS files. Under data manipulation, all can respect the file definition, do ascending and descending sorts, do multiple record deletions and updates, and do both multi- and level updates. For command strategy, none can switch to typed commands and none support a mouse or other input device. All three programs can be used with either two floppy disks or one floppy disk and one hard disk. All have excellent on-line help and reference documentation; none are copy protected. For report, all define the input form by "painting" on the screen. For output, all reports are defined by entering specifications. All can store report definitions, have headers and footers, and can specify printer setup codes, and all can output reports to printer, screen, or disk file. All use query-by-example (Powerbase also has a query language), but none can store queries unless macros are used. All support DOS 2.0 or later and can change default directories; none can be accessed from another directory.



## ■ LOW-END DATABASES

### ■ One of the reasons

*PFS:Professional File* is so easy to use is that it doesn't require you to do anything more than type in field names when creating a file.

nal form design. You can sort records on up to 64 fields. When scanning records, you can move either forward or backward through the file. For making changes to the entire file, or a subset of it, you use the global update feature.

The most significant report feature is the ability to do crosstab reports. A crosstab report summarizes, or cross-tabulates, data in a specified field relative to two other fields of the file. You do a crosstab report by typing an *r* (for row) in one field, a *c* (for column) in a second field, and an *s* (for summary) in a third field of the file's input form. The crosstab report is then printed using the same options as any other report.

The program also allows you to do mailing labels. Up to 64 labels can be printed across a page.

*Professional File* has other features that can best be categorized as utilities. Foremost among these is the import/export function that lets you copy 1-2-3 worksheets and delimited ASCII files to and from *Professional File*. Reports printed to disk can be transferred to word processing documents. You can construct macros by pressing Alt-0 from anywhere in the program. The program then copies keystrokes so that repetitive tasks can be automated. If needed, you can design a macro to pause for input. Another utility checks your data file for errors. If any errors are found, it recovers the data and builds a new file. This is helpful if a file has been damaged because it was left open when the system was powered down.



### Performance Tests: Low-End Databases

Our low-end database performance tests measured performance in common database tasks, such as sorting, searching, and indexing. We timed the performance of each program using a 25-record file and a 500-record file. The results show that although *PowerBase* is the most powerful of the three databases, it is slower than both *Q&A* and *PFS:Professional File*.

(Times given in seconds)	PFS:Professional File	PowerBase	Q&A
Sort 25-record file by last name	3.0	N/A	2.5
Index 25 records	N/A	25.8	3.0
Index 500 records	N/A	157.0	41.7
Retrieve 1 of 25 records without index	1.3	2.6	2.4
Retrieve 1 of 25 records with index	N/A	1.6	1.5
Retrieve 1 of 500 records without index	2.4	6.9	4.0
Retrieve 1 of 500 records with index	N/A	5.7	2.2
Execute 25-record report	6.7	11.6	4.9

N/A—Not applicable, program could not perform test

Other utilities include undo, which lets you return to a previous version of a record after changes have been made, and memory caching, which, as demonstrated in the performance tests, speeds up searches.

*PFS:Professional File* is completely compatible with *PFS:File*; anyone interested in using *Professional File* on a network can do so by buying *PFS:Professional Network*. The program is not copy protected; it supports PC-DOS directories; and it supports RAMdisks, Intel's Above Board, and IBM's TopView.

**SOME PFS LIMITATIONS** One of the reasons *PFS:Professional File* is so easy to use is that it doesn't require you to do anything more than type in field names when creating a file. This kind of simplicity has some inherent limitations. One is that there is no way to check for obvious data input errors. In other words, you cannot put data entry conditions on fields such as numeric, or unique, or less than 1,000, and so forth. Also, you can't index fields other than the first field of any record, which is done automatically by the program. This might, however, help speed searching through files for large databases.

Some problems crop up when doing reports. For example, if you want to print labels, fields must appear in the same order on the label as on the input form. This

means that if your input form has last name before first name, these must appear in the same order on a label.

Although all the above limitations may be inconvenient, the real limitation of *PFS:Professional File* is that it has no relational capabilities.

*PFS:Professional File* combines and extends the capabilities of *PFS:File* and *PFS:Report*. Satisfied users of *PFS:File* will likely opt to upgrade for \$75. Those who have discarded the program in favor of more-powerful relational programs are not likely to come back to the fold. New users will find an alluring program that does a good job of organizing their data with a minimum amount of time spent learning to use the program.

Overall, the product offers an easy solution to managing files without too many pitfalls. For anyone whose needs match the capabilities of the program, *PFS:Professional File* is a fine choice.

### ■ Q&A, Version 2.0

You will find that *Q&A*, Version 2.0, a file manager and word processor from Symantec, has much the same flavor as Software Publishing's *PFS:Professional File*. But comparatively speaking, *Professional File* is just the warmup before the race. *Q&A* gives you a general-store's



# Depending on which package you buy it in, dBASE® power will cost you \$169 or \$695.

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With dBase XL, both files and syntax are compatible with dBase III Plus. You can interchange databases, indexes, and other files between the two products. And if you've used dBase, you'll only need to learn the commands we've added (yes added) to make the dBase III language more powerful. They run the same. But with dBase XL you'll have more to run with.

If you're new to dBase, dBase XL's INTRO menus make dBase easy to use and learn. There's a "tutor" line that shows you which dBase III Plus command you're creating with your menu choices. dBase XL also has simple, easy-to-understand error messages, and two levels of "Help" are always just a function key away.

For you power users, we've included special features like access to DOS services, up to 99 windows without any other software, and automatic memory variable management. Whether you're programming for yourself or others, dBase XL is the ultimate dBase III Plus development tool.

Unlike dBase III Plus, dBase XL runs on PC-DOS or MS-DOS, so you can use it on the HP-150™, the TI Professional™, and the Apricot™, to name a few.

dBase XL. It's more power than the name brand without paying for the name.

## INTRODUCING dBase XL

WORDTECH SYSTEMS

P.O. Box 1747, Orinda, California 94563 415-254-0900

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CIRCLE 148 ON READER SERVICE CARD

## ■ LOW-END DATABASES

worth of flat-file management features and then throws in a natural-language interface and word processor, too, all for \$349.

**AS EASY AS PFS** Q&A is actually modeled on Software Publishing's older *PFS:File* and *PFS:Report*. However, instead of the single disk and lean (though effective) documentation of PFS products, Q&A has six disks and a manual hefty enough to scare off even the most dedicated users. The size of the manual, however, belies the ease with which you can perform file management miracles with Q&A.

To start off, you copy the six unprotected Q&A disks to a hard disk (or back them up for floppy disk users). In addition to the file manager, the package includes Intelligent Assistant, a word processor, a spelling checker, a tutorial, and sample files to load. Once this is done you simply type QA at the C> (or A>) prompt to begin. All system configuration setup is done from Q&A menus.

The first screen that appears is the main menu, which has six choices: File, Report, Write, Intelligent Assistant, Utilities, and Exit. Selecting any of the first five choices brings you to a full-screen submenu. To create a file, you select File, and the File menu appears with eight more choices. The first choice is Design File. When you choose this, the program prompts you for a filename. Once you enter a name, the Design menu appears.

The first choice, "Design a new file," brings up a blank screen reminiscent of *PFS:File*; you can paint an input form in

exactly the same way as you do with the *PFS* product. Once you've designed the form, you get your first glimpse of the depth of Q&A. Instead of returning you to the File menu, a screen appears that prompts you to define the "format spec" of the record. This simply means that you must tell the program the type of data that will be input in each field, for example, text, number, dates, money, and so forth. (A default value of text is shown in each field.) The next menu that appears is Global Format Options, which lets you define the format of numbers, currency, time, and dates in your file.

Another choice on the Design menu is "Customize a file." This selection, which takes you to the Customize menu, truly reveals all the power of Q&A. From this menu you can create indexes for any field of a record. To help prevent data entry mistakes, you can restrict field values. To speed up data entry, you can set initial values for fields. You can even include programming statements such as If . . . Then . . . Else in a field. Further features on this menu give you the ability to format field values, define custom help messages, edit lookup tables, and customize all the color, shading, and underlining of a specific file's form design.

**REPORT GENERATION** Q&A distinguishes between standard columnar reports, which are created from a Report menu, and label and record printing, which are done from the File menu. All reports are created in a similar way: you bring up a blank copy of the form design and specify the fields for the report. When printing records, you may do it in a free-form style (for labels) or a coordinate style (for printed forms).

I imported the standard 25-record 1-2-3 file into Q&A in 16.5 seconds. Q&A's search speed was slower than *PFS:Professional File*, even when indexing the file. The larger 500-record file was imported into Q&A from 1-2-3 in 4 minutes and 23 seconds. Q&A searches on this file were faster than with *Professional File* when the file was indexed.

The features of the Q&A file manager are just too numerous to cover completely in this review. Features new to Version 2.0 are required, unique and automatically numbered fields, a database recovery utility for damaged files, form ditto, a larger lookup table that can accept 64,000 characters, a fully definable table view, and total form count.

The built-in word processor, called Write, has many powerful features includ-

### FACT FILE

**Q&A, Version 2.0**  
 Symantec  
 10291 Torrey Ave.  
 Cupertino, CA 95014  
 (408) 253-9600  
 List Price: \$349  
 Requires: 512K RAM,  
 two disk drives, DOS 2.0

or later.

**In Short:** An easy-to-use, full-featured file manager with a natural-language interface and built-in word processor; it gets high marks for its overall excellence. Not copy protected.

CIRCLE 688 ON READER SERVICE CARD

First Name:	Last Name:	
Title:	Suffix:	
Nickname:		
ADDRESS		
Street:		
City:		
State:	Zip:	Country:
OTHER INFORMATION		
Company:	Products:	
Industry:	Last Contact:	
Position:	Extension:	
Work Phone:	Spouse:	
Home Phone:		
Children:		
Distance:	Age:	Holiday Mailing List
Comments:		
<span style="float: left;">VIEW, QRY</span> <span style="float: right;">Page 1 of 1</span>		

This Q&A screen, like many others, is reminiscent of those from workalike, *PFS:File*.



"After evaluating all the leading relational databases, we found only Paradox satisfies our wide-ranging need for powerful marketing and prospecting tools. It's quickly become our corporate PC database standard."

—Susan B. Magee, Senior Vice President, Information Services  
Massachusetts Mutual Life Insurance Company

## How Paradox<sup>®</sup> helps Mass Mutual pinpoint prospects

Massachusetts Mutual has discovered a new way to market financial products. It's a powerful yet easy-to-use relational database called Paradox.

### Premium prospecting

"With Paradox," explains Susan Magee, Senior Vice President, "our insurance agents can rapidly pinpoint all policyholders whose changing needs make them prospects for added coverage. Our agents have complete flexibility to query data the way they want and get immediate results. We are also writing a Paradox application that will let our agents prospect among non-

policyholders by importing commercial databases such as Dun & Bradstreet from our mainframe."

### Applications in record time

Mass Mutual selected Paradox for its ease of use and powerful, integrated development tools. They include PAL, the Paradox Application Language, and "scripts," which record keystrokes as users make selections from menus. Scripts can then be modified and linked into their programs.

"Development takes one-third of the time required by our previous database. Plus, Paradox gives us more useful results."

### Setting the standard

"We're getting rave reviews from agents. Soon, nearly 4,000 will use Paradox. It's so easy and Lotus-like, they can spend their time marketing instead of struggling with software. Paradox does more for us than any other PC database."

To find out more, get a Paradox Preview demo disk from your Ansa dealer. For the dealer nearest you, call 1-800-547-3000, Dept. 163. In Oregon or Canada, call 1-503-684-3001.

**PARADOX**  
by Ansa

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## ■ Q&A's most remarkable feature is the Intelligent Assistant, which lets you query the database with ordinary English phrases.

ing a spelling checker and column/row math capabilities. Write can be used with the file manager for mail-merge. It can also accept 1-2-3 worksheets and graphs.

**THE INTELLIGENT ASSISTANT** Q&A's most remarkable feature is the Intelligent Assistant, which lets you query the database with ordinary English phrases. The Assistant makes it easy and just plain fun to extract information, generate reports, and create, change, or delete forms from a file.

For example, you can retrieve information from a file by asking the Intelligent

Assistant to "Show me the name and salary of all the people who earn more than \$25,000 sorted by department." It can also perform feats that the File and Report modules of PFS can't do. For instance, if you wanted to compare different fields in a file you might ask, "Whose salary is between Smith's and Jones's?"

The Intelligent Assistant comes with a built-in vocabulary of about 400 words, and it automatically knows the words used in a specific file. You can personalize the Intelligent Assistant, but to do so you must take the time to teach it new words. This is time consuming, but fun. It entails giving the Assistant eight lessons before you start asking questions. During the lessons you input words that you normally use to refer to different fields and values in your database and other relevant information.

**SO WHAT'S THE CATCH?** Q&A offers just about all you could want in a file management program. However, to tap all this available power demands that you put some time into learning how to use the features. And if you are willing to spend that much time, you may eventually be disappointed that the program doesn't offer more powerful relational capabilities.

Also, while in general its capabilities

far exceed those of PFS:Professional File, it cannot do crosstab reports.

Q&A is an exceptional file-management program. It is easy to learn the basics of the program and it performs well. It offers added file-management capabilities and the Intelligent Assistant and Write make it that much more attractive.

## ■ PowerBase, Version 2.3

The two reasons you might buy a file manager rather than a more powerful relational database program are price and ease of use, the latter being the more significant.

The new release of PowerBase (Version 2.3), which sells for \$349, is a relational database that rates high enough in the ease-of-use category that in the reduced role of a flat-file manager, it's a fair contender to PFS:Professional File and Q&A. A feature-by-feature evaluation shows how far PowerBase goes beyond these other two.

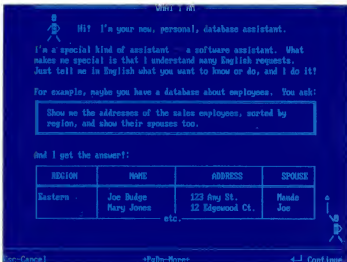
## DOES POWER MEAN HARD TO USE?

The PowerBase package includes five floppy disks and a manual about 2 inches thick. However, a pamphlet is included that also describes the PowerBase installation procedure.

Installing PowerBase is simple: Type A:Install, which will prompt you to insert each disk. When it is finished copying files to a subdirectory on your hard disk, it writes a .BAT file to the root directory, so that you may type PB from the root to bring up PowerBase.

The opening screen of PowerBase includes some important information. A horizontal menu along the bottom of the screen has five choices: Use, Define, Utilities, Change Application, and Exit. Just above that is a help line that says: "Use F9 and F10 to move the Menu Pointer, F8 to select." This message is the first indication that you must train yourself to use the function keys on your left-hand side for menu choices, rather than the more intuitive cursor/Enter keys on your right-hand side (an alternative is to use the Ins, Del, and PgDn keys).

In order to create a new file, you choose Define, which brings up a Define menu that lists Create, Change, Delete, Print Definition, and Done options along the



Q&A's Intelligent Assistant is a natural-language interface.

# In house.

# Poor house.



This slide was made in house in under an hour for under \$1.00.

## Presentations are on time, on budget with the Polaroid Palette.

Sending out for slides is expensive. And if you need them in a hurry, the prices can go through the roof.

But now you can change the whole picture with a brilliant solution from Polaroid.

It's called the Palette Computer Image Recorder, and it's a cost-effective way to produce color 35mm slides, as well as overheads and prints. In house. In minutes. For as little as 60¢ per slide.

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LCS Telegraphics  
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# Polaroid

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City \_\_\_\_\_

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Telephone \_\_\_\_\_



# NOW. POWERFUL WITHOUT POWE



A typical DBMS user's screen, after the 497th line of code.

SELECT ALL FROM CREDIT SORTED BY CREDIT RANK

— Choose an operator to compare (and more) — Choose (Date) when date —  
AND OR AND NOT OR NOT (Date)

Count	Operator	Value
OR	DATE	Between
AND	DATE	New York
AND	DATE	March 12, 1985
AND	DATE	American Banking Company

An R:BASE System V Prompt-By-Example (PBE) screen. With PBE's query capabilities, you can retrieve just the information you need. Without programming.

Aunt Betty's Sales Guide

Transaction date: 6/15/86 Date: 6/15/86

Transaction number: 4000

Customer number: 400

Name: Seavely Shoppes Inc.  
Address: 400 West 10th St.  
City/State/Zip: Dryden, New York 13055  
Phone: 800 575 0841

Stock #	Brand	Qty	Price	Extended Price
207	Band A. Beach Cookies	95	2.50	189.00
306	Peanut Butter Crunch	100	2.50	250.00
810	Double Rich Brownies	150	4.95	742.50

A data entry screen designed without programming, using Forms EXPRESS.

With most database management software for the IBM PC family and compatibles, you're quickly confronted with a painful reality: the only way to make your package live up to its promise is to learn its programming language. Which can take months. Then you have to write the code, line after frustrating line.

But now, there's R:BASE™ System V. And for the first time, you can quickly create programs that automate your most important data management tasks. Without programming.

Of course, with R:BASE System V, you can enter, query, and report on data in a non-automated, ad hoc fashion. Without programming. And there's a high-level procedural language for programmers. But that's just the beginning.

## R:BASE SYSTEM V. IT GIVES NON-PROGRAMMERS POWERFUL PROGRAMS.

With the EXPRESS System in R:BASE System V, you can access powerful features, without programming, that other data management software can't touch.

With Definition EXPRESS,

you can build a database structure with advanced features like computed columns, and searchable note fields. VIEWS that combine up to five tables in a single, powerful table. Data validation rules that check incoming data for errors. All without programming.

Then you can use Forms EXPRESS to create customized data entry forms. The forms you create can load data into five different tables, linked in One-To-Many relationships. You can also include scrolling regions, custom borders, and custom colors, all without programming.

And with Reports EXPRESS, you can design reports exactly the way you want. And see what they'll look like, right on the screen. To see how complex your reports can be, take a close look at the example at the end of this page.

Finally, you can tie it all together with Application EXPRESS. First, you design your own multi-level system of menus. Your first menu level might look like this:

Aunt Betty's Sales Reporting System

- (1) Enter Sales Data
- (2) Edit Sales Data
- (3) Print Daily Sales Report
- (4) File Processing
- (5) Exit

For each menu choice, you assign an action. For example, to define

menu choice #3, choose the action "PRINT", select the report you just created in Reports EXPRESS, and specify the appropriate data sorting and selection criteria. Then Application EXPRESS automatically writes the program code.

Which means you've just created a very sophisticated program to deliver the full power of your DBMS. And you've done it all without learning how to program. From this point on, every time you want to run a report, all you do is choose item #3. With one simple keystroke, you've got it.

## R:BASE SYSTEM V. IT GIVES PROGRAMMERS A POWERFUL ENVIRONMENT.

If you're an experienced programmer, you can use R:BASE System V to tackle the most demanding applications. You can use Application EXPRESS to create prototypes faster than with any other microcomputer-based DBMS.

There's a high-level procedural language, and a full set of relational operators that can leverage up to 80 tables, all of which can be open at once. While you're racing along, a data dictionary



# DBMS PROGRAMS R:BASE DBMS PAIN.

keeps track of the action.  
Automatically.

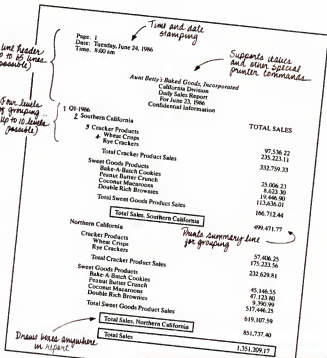
For demanding analyses, there's a set of 70 math, statistical, financial, scientific, and string manipulation functions. You also get more capacity for your data. Comprehensive menu-driven import/export capabilities. Superior relational power. And much, much more.

## THE MOST POWERFUL DBMS FOR ONE USER OR A WHOLE NETWORK— ALL IN ONE PACKAGE.

In addition to its standalone personal computing power, R:BASE System V has all the features you need to share data on a local area network (LAN) built right in. When you're ready to network—now or later—this is the only DBMS package you'll ever need. And no matter how many users you add, you'll never have any growing pains. Because an unlimited number of users, attached to a LAN, can access R:BASE System V.

### SEE FOR YOURSELF: \$15.95.

We're confident you'll find R:BASE System V the shortest distance to your data management solution. Visit your computer dealer for a trial run. Or, if you prefer, we'll send you a Trial Pack



for only \$15.95, plus shipping. It's a fully functional, row-limited version of R:BASE System V. Just call 1-800-547-4000, Dept. 802. In Oregon or outside the U.S., call 1-503-684-3000, Dept. 802.

What if you already own R:BASE 5000? If you bought your copy before June 30, 1986, you can trade it for the full power of R:BASE System V. For only \$99. (Offer expires January 31, 1987.) Just give us a call at 1-800-248-2001. Outside the U.S., call 1-206-885-2000.

A program to print this report daily, with a one-keystroke menu pick, was developed without programming using R:BASE System V's EXPRESS Technology. Whether you know how to program or not, R:BASE System V is the shortest distance to your data management solution.



## NEW R:BASE SYSTEM V FROM MICRORIM

## ■ LOW-END DATABASES

bottom of the screen and a File Directory along the top. When you choose Create, you are prompted for a filename. Once you enter the name, a blank entry screen appears along with the Create menu at the bottom of the screen.

You can create an input form by simply typing field names on the screen. However, each time you enter a field name (or prompt, as it is called in *PowerBase*), you must enter further data about the field. This makes for a kind of start-stop-start procedure. Selecting User-Entry from the Create menu lets you enter field attributes such as type and size. Another menu appears along the bottom of the screen with three choices: Entry-Rules, Table-Validation, and Done. Choosing Entry-Rules lets you define the field as unique, must fill, required, and uppercase only. You can also set maximum and minimum values or a default value.

Besides these powerful features, you may enter your own self-designed help messages that will appear above the menu bar whenever data is to be entered into the current field.

The other choice of the User-Entry menu, Table-Validation, is the way to make the program check user input against a table of values in another file. For example, if the field is for part numbers, the program will automatically check that any entry into the field is valid according to information in a separate part number file.

Creating an input form in *PowerBase* compares favorably in the ease-of-use cat-

When you select Entry Rules in *PowerBase*, this screen appears; a customized help message can be inserted here.

To link files in *PowerBase*, you simply choose Zoom-Link from the menu bar.

egory to *PFS* and *Q&A*. However, in *PowerBase* you must pay special attention to menus and become accustomed to using function keys instead of the cursor Enter keys to access them.

**POWERBASE PERFORMANCE**  
*PowerBase* imported the 25-record file from 1-2-3 in 55 seconds. To do this you have to return to the main menu and select Utilities, which includes Inload as one of



### FACT FILE



**PowerBase, Version 2.3**  
PowerBase Systems Inc.  
32100 Telegraph Rd.  
Birmingham, MI 48010  
(800) 292-7432  
List Price: \$349  
Requires: 320K RAM,  
two disk drives, DOS 2.0

or later.

**In Short:** A full-featured relational database manager that is not all that difficult to use and thus represents a formidable challenge to many of the high-priced file managers. Not copy protected.

CIRCLE 687 ON READER SERVICE CARD

# "We knocked their socks off."

This new PFS:Professional File came through just like you said it would. Can a guy be in love with a database program? All I know is that it let me pull in data from the company files in seconds, and I could break down bid numbers the way I've always wanted to. And the crosstabs gave me details I'd never even considered before. It all made sense to me. And it sure made sense to the client. I just called to say thanks for the tip, Bill. I owe you one.

## PFS:<sup>®</sup> Professional File

*File Management and  
Reporting Software*

**Power.** Manages large data bases, up to 4 million bytes. Powerful searching including alphabetic, numeric, "and," "or," "not" and record browsing. Sorted retrieval. Global updating. Mailing labels, up to 64 across. Full reporting and crosstabs on 64 columns.

**Performance.** Fast searching/sorting speeds. Speed keys and macros to shortcut menus and routine data entry. "Ditto key" for quick data entry.

**Fast To Learn/Efficient To Use.** Pull down menus display all options. No cryptic commands. On screen help anytime.

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**Network Support.** Runs on the IBM<sup>®</sup> PC, Net, 3Com<sup>®</sup> 3+<sup>™</sup> and Novell Advanced NetWare<sup>™</sup>/86 networks.

Ask your nearest dealer for a demonstration today. © Software Publishing Corporation, Mountain View, CA.



**PFS:Professional File. Expect Results.**

PFS: FILE owners call 1-800-255-5550 for upgrade information.  
(IBM and compatible PC owners only: Alaska and Canada call 1-503-799-4900).

## WHAT'S NEW IN POWERBASE, VERSION 2.3

*Version 2.3's new report-generation features eliminate one user's frustrations and make this powerful database only slightly more complex to learn.*

About 9 months ago, *PowerBase* saved my sanity. I was overseeing a large project that entailed tracking about 30 authors and over 100 pieces of software along with their associated manufacturers and marketing managers.

*PowerBase* is what made that job possible. It's a sophisticated relational database that allows users a great deal of flexibility in creating and maintaining informational files. Fields are painted on-screen and can be specialized to reflect a variety of types (such as alphanumeric, money, or date) and conditions (for example, unique and required fields or automatic uppercase). Its most publicized feature is *Datazoom*, or *Zoom*, a method by which files are linked together through common fields.

For example, I could link together a file containing manufacturers' names and addresses to one containing information on a specific product through the vendor's name field. By then linking the latter file to one giving particulars about the author reviewing that product (through the product name), I could jump easily and very quickly from one file to the other.

However, I found myself hitting several frustrating dead ends when it came

time to print out reports. Version 2.2's report module was not quite as flexible as its input facilities, especially when you included fields from linked files in your report. For example, if I was creating a report using my *Products* file, I could include names from the *Authors* file but could not report on all products reviewed by one author. This led to the usual types of convolutions that follow when you must work around, rather than with, your software product.

*PowerBase's* new Version 2.3 has, happily, eliminated much of the cause of my frustration. While the overall product does not differ greatly from its predecessors, the programmers have apparently taken a good long look at the report module and added several functions that greatly improve its functionality.

For example, Version 2.3 allows users to extend the product's select function to all fields in zoomed files, including fields that are not being included in the original report. This addition alone would have saved me a couple of hours worth of revisions.

The new version also allows you to include nonstored fields in your reports. *PowerBase* contains a field definition called *Lookup*, which allows you to pull

information from another file into that field. If you store the information, it becomes a permanent part of the file's saved data. However, if you specify that the data be nonstored, the field remains dependent on the secondary file, and thus the information changes if it is altered in that other file. Previously, *PowerBase* would not allow you to include *Lookup* fields in a report, which could be a great inconvenience if, for example, you had a nonstored field containing a salesperson's profits to date and wanted to include it in a report.

Many of the improvements to *PowerBase* concern its mathematical capabilities. Reports have now been divided into two types: detailed, which contains all the information chosen (and which remains the default), and summary, which only includes summarized data such as averages and counts. You can now perform calculations at the report level, rather than only in the individual data files, enabling you to take totals, averages, and so forth, on the results of two fields in two separate files—for example, you can extract your sales expenses from one file and subtract them from your sales figures in a second related file. And the types of calculations that are available

its choices. Once you select this, you must enter some additional information such as the file type and information from a typical record before you can proceed.

The next task was to sort the records, but it wasn't possible, since *PowerBase* doesn't have a command for sorting unless you are creating a report. Searching for records is done through query by example. You choose *Select* from the menu and fill in a blank form with the selection criteria. It took 2.6 seconds to find a particular record.

Indexing fields is done by returning to the *Define* menu and selecting *Change*. This brings up a menu with *Index*. Up to

six fields of a file can be indexed. Indexing the file on a field took 26 seconds. Searching the file again took 1.63 seconds.

On the 500-record 1-2-3 file, *PowerBase* took 5 minutes and 19 seconds to import, 6.9 seconds to search, 2 minutes and 37 seconds to index, and 5.7 seconds to search with the index. These times were generally slower than those for *PFS:Professional File* and *Q&A*.

**A BRIEF REPORT** To create a report in *PowerBase*, select *Report* from the *Use* menu. A report screen appears with the *Report* menu. Selecting *Cols* brings up a blank input form and a *Cols* menu. You

then choose the fields needed for the report. Choosing *Col* details from the menu gives you complete control over the look of the report.

Once this is done, you can sort, add headers and footers, do totals, and perform other tasks by selecting appropriate choices from the *Report* menu. (For a closer look at some of the new report features, see sidebar "What's New in *PowerBase*, Version 2.3.")

Like *Q&A*, *PowerBase* has a bushel of features. One of the most powerful of them all is a feature called *Datazoom*. Whenever you select *Zoom* from the menu, you link from two to ten files together through a

have been increased; you can now generate averages, minimum and maximum values, and several other values at the subtotal and grand total levels of a report column.

Version 2.3 includes a few other less important features, such as the ability to pick up the time as well as the date from DOS and to inload and outload *dBASE III* and *dBASE III Plus* files. A very basic feature which, for some reason, was missing from previous versions of *PowerBase* was the ability to delete (from within the program) report definitions that had been previously stored for reuse. This may seem like a minor point, but when I had accumulated 20 or so different report definitions over the course of a project, I would have been grateful for the chance to remove a few from my directory.

It's true that because of these new features Version 2.3's report module is slightly more complex to learn. But *PowerBase* users who want to optimize use of the software's report function will find it worth the trouble.

—Barbara Krasnoff

*Barbara Krasnoff is a frequent contributor to PC Magazine.*

common field. So, for example, you can link a record from a client file to multiple records from an invoice file through an account number field. While searching a file, you can zoom to another file to search related records. Also, reports can combine information from several files. This feature gives *PowerBase* relational capabilities and lets you construct database applications consisting of multiple interrelated files.

Another fine feature of *PowerBase* is the way it anticipates user responses. *PowerBase* always makes a guess at the most likely response of the user, whether it concerns a menu choice or selection of

## PC EDITOR'S CHOICE

*The Editor's Choice is among three excellent products. Two of them, PowerBase and Q&A, were Editor's Choices in Project Database II, and the other has been a best-selling product for a long time.*

*PowerBase extends beyond PFS:Professional File and Q&A, due to its relational features. So if this kind of product is required for your applications, it is the only choice among the three. However, as a file manager, it comes close, but falls short in the ease-of-use category to PFS:Professional File and Q&A, both of which use a more innovative approach to file design and reporting.*

*Although PFS:Professional File and Q&A are workalikes, the PFS entry gets the nod for ease of use "out of the gate." There is no worry about file constraints and things like that. But "down the stretch," Q&A wins for depth of function and overall flexibility. Add to this its unique Intelligent Assistant and you have an Editor's Choice. Q&A may not be capable of going the relational distance, but it sure is the best of the file managers.*

files or fields. Sometimes the nested menus of the program can be confusing, but if you pay attention to the highlighted choices, you can often figure out the correct choice to make.

*PowerBase* is certainly a first-rate database that includes a horde of database features and is relational to boot. Compared with first-rate file managers, such as *PFS:Professional File* and *Q&A*, *PowerBase* is a little slower and costs a little more. For single-file applications, it has a feature edge over *PFS*, but not over *Q&A*. Because of the way it uses function keys, it takes more time to become accustomed to working with *PowerBase*, and, without even considering its relational features, I think *PowerBase* is somewhat more difficult to learn than the other two.

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- ☐ #489 PROCOMM Professional communications program written in compiled Microsoft C and assembly code.
- ☐ #533 SISK WRITER Perfect for spreadsheets, this application prints first lines slowly.
- ☐ #538, 529 NEW YORK WORD Powerful word processing with on-screen editing, mail merge, auto hyphen, and more.
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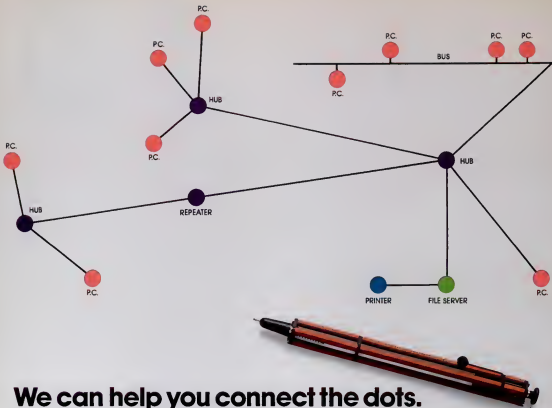
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# SuperCalc4: A GREAT CONTENDER

---

*Solid performance and elegant but useful features make the newest version of SuperCalc an excellent alternative to its long-standing market rival, 1-2-3.*

**T**he electronic spreadsheet was the first microcomputer applications program business users took seriously and probably the one we hear about the least often. Since the genre was introduced less than 10 years ago, word processing, database management, telecommunications, project management, and desktop publishing have come forward to take their places in the repertoire of the business and professional user. While the newer applications have received a great deal of attention and the newest ones—telecommunications and desktop publishing—are still seeking standards, electronic spreadsheets have been continually refined and made more powerful.

*SuperCalc* from Computer Associates has long been a major player in the spreadsheet world. The latest version, *SuperCalc4*, is an elegant spreadsheet program with flexible but uncomplicated graphics, func-



## ■ SUPERCALC4

tional data management, a nifty macro learn facility, and several features that make it a pleasure to use.

**BACKGROUND** The *SuperCalc* spreadsheet program has been around since 1980. Computer industry history says the inventors of *VisiCalc*, the first electronic spreadsheet, did not want to program a version to run on the CP/M operating system, which, in the late seventies and early eighties, was considered the serious disk operating system for business microcomputer users. A small company named Sorcim took on the task of creating a CP/M spreadsheet and thus was born *SuperCalc*, the most famous of the

■ *SuperCalc4's* menu structure makes for a busy screen, but it does provide you with plenty of information. And the status line is equally cluttered.

Visiclones. *SuperCalc* was among the software packages bundled with the highly successful Osborne computer and became a standard on its own.

When Lotus Development Corp. released *1-2-3* in January 1983, the program was hailed as the newest-generation spreadsheet and was acclaimed as integrated software. While it took a year or so for users to realize that *1-2-3* didn't fully deliver on its promise of easy and complete integration of spreadsheet, graphics, and database management, that issue became moot. *1-2-3* and the IBM PC gained entry to American and world corporations and became a pair of business standards. In the meantime, *SuperCalc* kept on improving and continued to build a dedicated following. When PC-DOS and MS-DOS became the business standard operating system, *SuperCalc* was rewritten to work in that

FILE LIST  
Directory displayed is C:\\$C4  
Data directory is C:\\$C4

\*.CAL

BLACKJACK	.cal	CARDATA	.cal	CURRENCY	.cal	DEMOS	.cal
EMMAX	.cal	EMPILOT	.cal	GROWTH	.cal	LESSONS	.cal
LESSONS	.cal	LESSON7	.cal	MACROS	.cal	MENTEST	.cal
SCREENS	.cal	SICFIG	.cal	SIMPSON	.cal	TABLE	.cal
TEN	.cal	TENBAR	.cal	WINE	.cal	TAX	.cal

Select (DIRECTORIES) to list subdirectories 11390976 bytes free  
FILE F2:Edit F4:Update data directory F6:Toggle details

*SuperCalc4's File List screen displays all files in a given subdirectory that meet the file specification in the box. You can also easily change the default data dictionary from this screen.*

operating system, which today accounts for the bulk of its sales. Today, *SuperCalc4* competes directly with *1-2-3*, Release 2, in the PC-DOS/MS-DOS world.

**DEFINITION** The current version of *SuperCalc* is at heart a spreadsheet program with eight different graph types, data sorting, extraction and selection capabilities, a full-featured macro writing facility for application automation, and the ability to exchange data with other programs via standard data formats. *SuperCalc4's* reporting capabilities are enhanced by the program's inclusion of *Sideways*, the printer utility program that lets you print wide spreadsheets the long way (landscape mode).

**USER CONTROL** *SuperCalc4* puts you in charge of the program by displaying a lot of information on the screen and providing several features to make using the program easier and quicker than other spreadsheets. The menu structure makes for a busy screen, but it gives plenty of information. The status line is equally cluttered. The ability to quickly list already-named ranges and to see their coordinates

without having to step through a command sequence is helpful. Displaying lists of spreadsheet files and attached graphs is easy, and *SuperCalc4* provides the ability to comment the lists for ease of perusal and selection. *SuperCalc4* devotes two lines to command menu choices and uses a third line at the very bottom of the screen to explain the highlighted choice or to show next-level selections.

By comparison, *1-2-3* uses a single-line menu with one help line. The advantage of *SuperCalc4's* approach is twofold. Beginners can see more top-line choices at one time, and practiced users will appreciate having to use fewer keystrokes to perform many tasks. For example, the initial commands to delete a row in *1-2-3* are /WDR (for Command, Worksheet, Delete, Row) and in *SuperCalc4* just /DR (Command, Delete, Row).

Saving a file in *1-2-3* starts with /FS (Command, File, Save) and /S (Command, Save) in *SuperCalc4*. Typically, though not always, you save one keystroke per command in *SuperCalc4* compared with *1-2-3*.

The trade-off for seeing more on the screen is the possible confusion. By displaying so much information on the screen

at once, *SuperCalc4* risks confusing users who may already be overwhelmed. Experienced users can turn the menus off, which you can't do with earlier versions of *SuperCalc* or with *1-2-3*.

In addition to the usual way of moving around menu choices—via the cursor control keys or by hitting a first or significant letter—you can also make *SuperCalc4* scroll through alternatives by tapping the Spacebar.

When you move through menu levels in *1-2-3*, you have no trace of the previous menus, which at times can be confusing (especially to beginners). *SuperCalc4* scrolls a complete trail of executed choices running horizontally on the screen so you can see how you got to where you are at any time. Both programs let you step backward one level at a time by using the Esc key, and both let you clear the menu stepping process line by hitting Ctrl-Break. *SuperCalc4*'s command trail display is helpful but adds more to an already-busy screen.

*SuperCalc4*'s status line is also informative. In addition to the present cursor cell position, the status line indicates direction for the follow-on entry feature, current column width, remaining computer memory available, and the position of the last

■ *SuperCalc4* keeps a complete trail of executed choices running horizontally on the screen so you can see how you got to where you are at any time.

column and row with a cell entry. *1-2-3* tells you only the current cell coordinate. *SuperCalc4* also prompts you on the help line that F1 will give help, F3 will list range names, and Ctrl-Break will cancel an operation. *1-2-3* gives no such information. The *SuperCalc4* edit line identifies the current cell entry as Text or Formula, while *1-2-3* gives only a single apostrophe mark to indicate a text entry. *SuperCalc* also shows more and clearer information about cell formats than *1-2-3* does.

Neither *SuperCalc4*'s nor *1-2-3*'s ap-

proach to displayed information is clearly better. All else being equal, personal preference could decide which style to choose. In any case, experienced users may find that they rarely look at the edit, status, menu, and help lines. When they do look, however, the *SuperCalc4* users will find more there.

Both *SuperCalc4* and *1-2-3* let you name ranges. Naming ranges saves time and makes it easier to refer to parts of a spreadsheet than having to remember, type, or point to spreadsheet coordinates. In keeping with easy access to information, *SuperCalc* provides an instant reference to previously named ranges. The *1-2-3*, Release 2, /RNT (Command, Range, Name, Table) will also give a two-column listing of named ranges and their coordinates, but the table will show up in the current spreadsheet and could erase data for the unwary. *SuperCalc4* simply flips you to another screen when you tap the F3. If you highlight a range name, its coordinates are displayed as well. *SuperCalc4*'s method is preferable.

The F3 key serves double duty, displaying a file list any time a filename is the next appropriate entry. The file list can show just names, or a detail screen will indicate size, creation time and date, and a

```
FILE LIST - DETAILS
Directory displayed is C:\SC4
Data directory is C:\SC4

*.CAL

BLACKJACK.CAL
CARMEN.CAL  RENTALS
CURRENCY.CAL
  Graph 1 - Multiple-currency model          Area
DEMOS.CAL
FINMAX.CAL  FINMAX locate the maximum of a function
  Graph 1 -                                     Bar
FMPELOT.CAL Quickdraw McGraph
  Graph 1 -                                     X-Y
GROWTH.CAL  Growth Projection
  Graph 1 - Least Squares Log Projection      X-Y
  Graph 1 - 95 % conf. limits                  X-Y
  Graph 1 - Data, Projection and 95% Limits   X-Y
LESSONS.CAL Income Statement

Select (DIRECTORIES) to list subdirectories 11350976 bytes free
7/Load
FILE F2:Edit F4:Update data directory F6:Toggle details
```

In addition to a simple list of files in a directory, you can also see more details about a file, including any associated graphs, their types, and their titles.

## PC MAGAZINE FACT FILE

**SuperCalc4, Version 1.0**  
Computer Associates  
2195 Fortune Dr.  
San Jose, CA 95131  
(800) 227-0112  
(800) 228-1090 (in Calif.)  
List Price: \$495

**Requires:** 256K RAM, two disk drives, DOS 2.0 or later. (Will support up to 8 Mbytes of expanded memory and will support 8087 and 80287 math coprocessors. Has full color support for EGA graphics as well as compatibility with monochrome, CGA, and Hercules boards and monitors.)

**In Short:** *SuperCalc4* is an elegant spreadsheet program with flexible but uncomplicated graphics, functional data management, a nifty macro learn facility, and several features that make it responsive to beginning and expert users alike. Not copy protected.

CIRCLE 66 ON READER SERVICE CARD

## ■ SUPERCALC4

spreadsheet comment (whatever is entered in cell A1). Any graphs created as a part of a spreadsheet are also listed.

You can easily switch subdirectories to view file information or to load or save files. You can also conveniently switch the default data subdirectory.

The common thread in the above features is giving the user access to as much information as possible. *SuperCalc4* also has other features that make it easy to work with.

The /GF (Command, Global, Formula) toggles the screen between displaying entered formulas and the resultant values, a valuable aid in checking how something was figured. You can print the sheet this way with all formulas displayed, an extremely helpful editing or auditing facility.

*SuperCalc4*'s auto-advance feature can also be toggled on and off. When auto-advance is on, /GN (Command, Global, Next), the sheet remembers the last direction in which the cursor was moved. When you complete the next entry and hit the Enter key, the cursor moves in the direction of the previous move. This feature can speed data entry.

You can use the /G" (Command, Global,") toggle option to make *SuperCalc4* try to read everything first as a text entry or as a formula. This feature can greatly speed entering formulas. Note that with the /G" on, text entries must be preceded with a double quotation mark.

NA entered into a formula cell stands for Not Available and is another spreadsheet editing aid. Any dependent cells will also display NA, reminding you of a particular cell's effect on them.

Current cell column and row border coordinates are highlighted, making it that much easier to know where you are on a spreadsheet. At times, the border highlighting was a bit distracting; it pulled my attention from the active cell, but again *SuperCalc4* is providing you with more information, in this case information also available on the edit line.

You can use the *WordStar* cursor control convention Ctrl-S, -D, -E, and -X to move around the spreadsheet.

**FORMAT CONTROL** Spreadsheet cell contents usually have an automatic manner of displaying entries, referred to as the de-

	User-defined formats							
	1	2	3	4	5	6	7	8
Floating \$	Y	Y	Y	Y	Y	Y	Y	Y
Embedded Commas	Y	Y	Y	Y	Y	Y	Y	Y
Minus in ( )	N	N	N	N	N	N	N	N
Zero as Blank	N	N	N	N	N	N	N	N
%	N	N	N	N	N	N	N	N
Decimal Places	2	2	2	2	2	2	2	2
Scaling Factor	0	0	0	0	0	0	0	0

+ Alt  
Y(es) or N(o) ?  
16/Format, Define,  
MENU Precede numbers with a dollar sign - \$XXXX

*SuperCalc4* lets you preset eight user-defined formats, which can be various combinations of floating \$, embedded commas, negative numbers in parentheses, zeros displayed as blanks, percent signs, number of decimal places displayed, and a scaling factor.

■ Since you might want to declare various formats for different purposes within the same spreadsheet, *SuperCalc4* has hierarchical levels of formatting.

fault format. For example, text is usually aligned to the left side of the cell and numerics are aligned to the right side. The number of decimal places displayed is usually limited only by those that will fit. The spreadsheet's ability to allow the user to specify other formats for cells is called format control. *SuperCalc4* lets you format a single entry cell, full or partial rows or columns, and rectangular blocks of cells, as well as declare a global format description to

control all cells in a worksheet.

Since you might want to declare various formats for different purposes within the same spreadsheet, *SuperCalc4* has hierarchical levels of formatting. In general, the hierarchical order gives precedence to small areas of the spreadsheet. The order of hierarchy is cell entries first, rows next, and columns and global formatting last.

You can format numbers as well as text for left or right alignment. Text can also be centered.

*SuperCalc4*'s user-defined formatting option is unchanged from previous versions of the program. By using this option you can choose from a matrix of formatting options, including floating \$, embedded commas, negative numbers displayed in parentheses, zero entries shown as blanks, percent signs, decimal places, and scaling factors. Eight user-defined formats are allowed.

*SuperCalc4* features titling, the ability to hold a vertical or horizontal part of a worksheet still, such as column or row headings, while the rest of the worksheet scrolls by. Windowing—splitting the spreadsheet horizontally or vertically into two separate pieces to keep track of one

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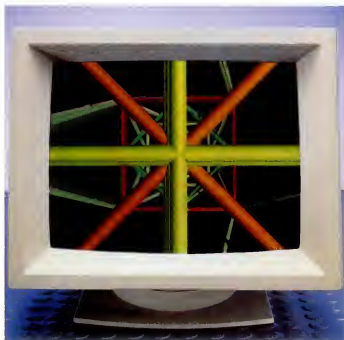


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# NEC

## ■ SUPERCALC4

part while changing another—is also a standard feature in spreadsheets. You are limited to two windows in *SuperCalc4*, but they can be set to synchronize to move together or to act independently of each other. In *SuperCalc4* you can set different formats in each of the windows to view two different ways of displaying the same information simultaneously.

*SuperCalc4* has a helpful file consolidation option that you will find is extremely useful for such purposes as combining departmental reports and updating periodic figures. *1-2-3's* File Combine option allows you to copy, add, or subtract an external file into the present spreadsheet, but *SuperCalc4* lets you perform addition, subtraction, multiplication, and division on numbers in the present sheet with the corresponding numbers in the incoming spreadsheet and even to enter the result in the destination sheet's cell.

One benefit of *1-2-3's* extra keystroke for most commands is the relative difficulty of erasing a *1-2-3* spreadsheet. In *1-2-3* the command is /WEY (Command, Worksheet, Erase, Yes). *SuperCalc4's* /ZY (Command, Zap, Yes) will throw away a whole sheet. Since the Yes response easily becomes automatic after you work with

■ *SuperCalc4* features titling, the ability to hold a vertical or horizontal part of a worksheet still while the rest of the worksheet scrolls by.

applications software for a while, *1-2-3's* extra keystroke is good to have. Of course, in each case you can lose all of your work by hitting /QY (Command, Quit, Yes), but zapping a spreadsheet is too easy.

**SPREADSHEET** *SuperCalc4*, in theory, allows larger spreadsheets than *1-2-3*. *SuperCalc* has an adjustable border size, the largest setting 255 columns by 9,999 rows. *1-2-3* is limited to 256 columns and 8,192 rows. If all the cells were used,

*SuperCalc4* would allow 2,549,745 cells, and *1-2-3* only 2,097,152 cells. Making much of that difference is silly. In practice, no one is going to fill all the cells anyway. You would first run out of memory.

Of greater importance is the way products work on typical machines and with a typical application. I tested spreadsheet performance of *SuperCalc4*, *SuperCalc3*, *1-2-3*, Release 1A, and *1-2-3*, Release 2.01. I performed all the tests on the same machine, an IBM PC-XT with 640K of conventional memory. I used a hard disk drive, but that did not affect the tests I ran.

In general, both Lotus products used less memory for program files and therefore were able to hold larger spreadsheets in memory than the *SuperCalcs*. The two versions of *1-2-3* also recalculated my sample sheet in less than half the time it took *SuperCalc3* and *SuperCalc4*.

Interestingly, the Computer Associates products used less disk space to store the sample file than either version of *1-2-3*.

Although my own tests are not definitive, it seemed that *1-2-3* was faster and could hold more with the same memory than *SuperCalc4* could.

*SuperCalc4* can be configured to one of three different sizes: 255 columns by 9,999 rows, 127 columns by 2,000 rows, or 63 columns by 254 rows. You can choose a size yourself or *SuperCalc4* will determine the memory available and will set the spreadsheet size automatically.

A second factor involving memory usage is whether *SuperCalc4* is set to work in the Fast or the Data-space mode. Fast mode means that more program components are loaded into memory, while Data-space reserves as much room as possible for data. Optimizing for both size and memory use allowed me to fit an extra 1,580 cells in my test worksheet.

You also have a great deal of control over how *SuperCalc4* solves equations. You can select natural order, row, or column order. You also can assign a set number of iterations, set the sheet to solve a problem no matter how many tries it takes, or just let it run continuously in circular fashion. When the sheet is recalculating, you can stop the process at any time with the Ctrl-Break key combination. Circular reference (a cell reference within a formula in the same cell) is often considered a "no-



When working with a spreadsheet, at any time other than when you're prompted for a filename you can call up a list of all named ranges in the present file. The highlighted range name and coordinates are displayed on the status line.

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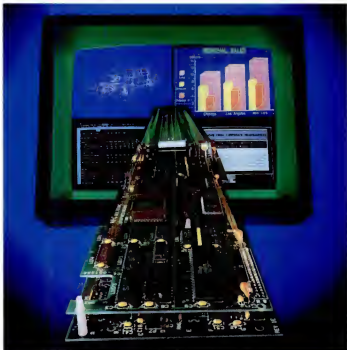
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## ■ SUPERCALC4

no" in spreadsheets, but the ability of a spreadsheet to seek a solution based on relative and participating numbers is very powerful.

Lookup tables are simple to set up in *SuperCalc4*. A lookup table is usually used for coded references to other data. For example, a state code may return the name of the state spelled in full. The statement LOOKUP (D5,A50:A60) tells *SuperCalc4* to use the contents in cell D5 to find a match somewhere between cells A50 and A60. Once the match is found, *SuperCalc4* will return whatever is in column B in the cell just to the right of the matching cell in column A.

*SuperCalc4* has over 75 mathematical, statistical, conditional, trigonometric, and financial functions. The advantage of built-in functions is that you don't have to write the formulas yourself.

**GRAPHICS** *SuperCalc4's* graphing component is especially easy to use. You can also see graphs on a monochrome monitor with *SuperCalc4*, a trick most other programs are not able to perform without special video boards. The monochrome graphs are nice as long as you don't use curved lines. The pie chart is quite crude; the others are presentable,

however. Even the pie chart gives a reasonable representation of what the graph will look like when printing.

Unlike 1-2-3, *SuperCalc4* does not require you to go through the process of using an external program to print a graph. Once you have set all of your graph's options on the spreadsheet, you can send it directly to the printer or plotter. This direct connection is a terrific feature.

*SuperCalc4* supports eight types of graphs: pie, exploding pie, bar, stacked bar, line, x-y, area, and high-low. You also have a choice of eight fonts for labeling and titles. A *SuperCalc4* graph can have up to ten data groups in a single graph.

I tried to trick the program by telling it to send a graph to a plotter when I had neither a printer or plotter attached, but *SuperCalc* recovered nicely, informing me that my printer was either out of paper or not ready. At that point you use the Ctrl-Break key combination to regain control of the screen.

You can save up to nine graphs with each spreadsheet, to which *SuperCalc4* automatically assigns the names Graph1, Graph2, Graph3, and so on through Graph9. Whenever you use the F3 key to access a file list and then tap F6 for details,

you will also get a summary of the graphs created with each spreadsheet.

**DATA MANAGEMENT** Spreadsheet programs usually claim data management capability. But anyone with experience with even a simple flat filing program may well be disappointed in spreadsheet data handling. The problem is not that spreadsheets aren't capable, they're just not appropriate for many filing applications. Designing custom entry screens and report formats for a spreadsheet program can require an unreasonable amount of time and effort compared with filing programs or screen and report generation programs that let you "paint" both entry screens and report designs.

Spreadsheet programs often can sort quickly and easily by column or row. As long as you don't mind entering data in co-

■ You can also see graphs on a monochrome monitor with *SuperCalc4*, a trick most programs are not able to perform without special video boards.

lumnar tables and reading it in the same format, then spreadsheet data handling may be just what you need. A spreadsheet is particularly appropriate when you have many calculations in your tables or when your data has a numeric relationship with other data and changes frequently.

When working with a spreadsheet as a data manager, you need to recognize new nomenclature. Each category of information is called a field and, in a spreadsheet, is kept in a separate column. Individual entries, called records, are arranged horizontally. The top line of the area set aside for data management must contain labels, usually short, descriptive text entries.

In theory, *SuperCalc4* can have up to

Output, Printer or File	SuperCalc4 AnswerScreen
Range	Specifies the range to output - there is no default. You can specify multiple output ranges per report.
Go	Generates the report and sends it to the printer or disk.
Monitor	Previews the report on the monitor.
Line	Sends a line feed, updating the current line count.
Page	Sends a form feed honoring Headers, Footers, and Margins.
Options	Specifies Report format, Page layout (including margins), Paper control, Titles, Number of copies, Borders, Headers, Footers, & Printer initialization setup string.
Rep	Clears output range -- resets default parameters.
Align	Resets the line and page counters. Select for a new document.
Quit	Returns to spreadsheet.
Press any key to continue -	
MENU: Assign Report Range	

*SuperCalc4's* context-sensitive help screens show information relevant to the command you are prompted for in the command menu.



## THE LATEST FROM LOTUS

While *SuperCalc* got a face-lift with the new *SuperCalc4*, Lotus hasn't been silent, either. The changes in *1-2-3* and *Symphony* are minor compared with those in the new version of *SuperCalc*, but at the same time Lotus Development Corp. has released *HAL*, an add-on, RAM-resident program that allows users to operate *1-2-3* with English-language commands. *HAL* brings unprecedented features to *1-2-3*, and *SuperCalc4* can't compete here.

Lotus recently upgraded *1-2-3* to Release 2.01, and *Symphony* to Release 1.2. The good news is you can now do a legal hard disk installation; the bad news is both products are still copy protected. Actually, there are a number of improvements in what Lotus calls "maintenance" releases.

Most of the changes in *Symphony* address compatibility with *1-2-3*. In addition to its ability to read .WKS worksheet files, *Symphony* can now read the .WK1 files generated by *1-2-3*, Release 2. Two statistical analysis commands that previously existed only in *1-2-3*, Release 2, Matrix and Regression, have been added to *Symphony* as application add-ins. Range Input, also an application add-in, has been added to limit cell pointer movement to unprotected cells. Printer

support has been augmented with the HP Laserjet Plus, and in the communications module it supports three file-transfer error-detecting protocols: Xmodem, B protocol, and Blast.

Both *1-2-3*, and *Symphony* offer installation to a hard disk as a selection during the installation process, but the programs arrive with a separate Copyhard utility, as well. Copyhard worked fine and if you want, you can use the floppy system disk as a key disk on another computer. So why copy-protect it in the first place?

The most dramatic improvement in *1-2-3*, Release 2.01, is the decrease in the time it takes to retrieve a file. In fact, one of the biggest complaints with Release 2 was how much slower it was than 1A.

While it took 1A 10 seconds to retrieve a 91K-byte file from a hard disk on an 8-MHz AT with an EGA monitor, Release 2 needed 16 seconds for the same file. Release 2.01 took only 7 seconds. The greatest disparity occurs with big files. Release 1A took 67 seconds to display a 517K-byte file while Release 2 required 333 seconds, about 4½ minutes longer, to get the same file. Release 2.01 has been improved considerably, win-

(continues)



## FACT FILE

### *Symphony*, Release 1.2

Lotus Development Corp.  
55 Cambridge Pkwy.  
Cambridge, MA 02142  
(617) 577-8500

List Price: \$695; \$15 shipping and handling for registered owners of Release 1.1, \$75 upgrade from Release 1.0.

Requires: 384K RAM, DOS 2.1 or later.  
In Short: A modest improvement, mostly done to maintain parity with *1-2-3*, Release 2. Copy protected; one hard disk installation.

CIRCLE 888 ON READER SERVICE CARD

### *1-2-3*, Release 2.01

Lotus Development Corp.  
55 Cambridge Pkwy.  
Cambridge, MA 02142  
(617) 577-8500

List Price: \$495; \$15 shipping and handling for registered owners of Release 2.0; \$150 upgrade from Release 1A.

Requires: 256K RAM, DOS 2.0 or later.  
In Short: Not much change from Release 2, although a few bugs were fixed and files load faster. Copy protected; one hard disk installation.

CIRCLE 889 ON READER SERVICE CARD



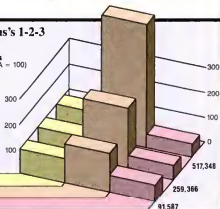
## Performance Test: File Retrieval Times with Lotus's 1-2-3

*1-2-3*, Release 2, is much slower than Release 1A when it comes to file retrieval. Release 2 can take up to five times longer to retrieve a file from disk and display it to the screen than Release 1A. The problem is corrected in Release 2.01, which is even faster than 1A.

(Times given in seconds)

File Size in Bytes	91,587	259,366	517,348
Release 1A	10	33	67
Release 2	16	83	333
Release 2.01	7	19	38

Relative Times  
(Ratio: Release 1A = 100)



## ■ SUPERCALC4

("Latest from Lotus" continued)

ning the race by retrieving that huge worksheet in just 38 seconds.

A few changes are apparent concerning financial @ functions. In Release 2 if you entered a negative argument, you would get an ERR. The functions @PMT, @PV, and @FV now accept negative arguments. In mixed-formula references, labels now equate to zero.

Lotus also eliminated some bugs in Release 2.01, but other than faster file retrieval, there isn't much of a change from 2.01.

Then there's HAL. Many products do what 1-2-3 does, but not many can perform like HAL and 1-2-3 together. For those who haven't heard, HAL is a memory-resident companion product for 1-2-3, making 1-2-3 much easier to use for beginners and more productive for experienced 1-2-3 users. In HAL's bag of tricks are some never-before-possible features such as "undo" and the ability to link spreadsheets. Also, creating big worksheets and playing with huge databases are much easier with HAL because of the English-language commands.

To paraphrase Lee Iacocca: the competition's good; HAL makes 1-2-3 better.—Christopher Barr

Christopher Barr is a frequent contributor to PC Magazine.



### FACT FILE

#### HAL

Lotus Development Corp.  
55 Cambridge Pkwy.  
Cambridge, MA 02142  
(617) 577-8500

List Price: \$150

Requires: 512K RAM, DOS 2.0 or later, 1-2-3, Release 1A, 2, or 2.01.

In Short: A RAM-resident program that uses English-language commands to operate 1-2-3. HAL introduces unprecedented features to 1-2-3, including an "undo" option and the ability to link spreadsheets. Not copy protected.

Circle 688 on Reader Service Card

### SIDEWAYS version 3.00

```
Printer port:          LPT1:          IBM Graphics Printer

Vertical form size (inches): 11.00
Horizontal form size (inches): 8.00

Character font:        Normal        5 x 15 dot matrix
Density:              Single
Character spacing (dots): 1          12.00 characters per inch
Line spacing (dots):   3            6.66 lines per inch

Left margin (inches):  0.00
Top margin (inches):   0.00
Bottom margin (inches): 0.00        53 lines per page

Starting page:         1

Directory:  C:\SE4
Enter name of print file: show.pri

F1 for HELP                                F10 to exit
```

SuperCalc4 includes the program Sideways for printing wide spreadsheets the long way on continuous-form paper.

255 fields (columns) and 9,998 records. In practice, however, spreadsheets aren't generally used for databases with that many fields or records. Even if the file could fit in memory, a full spreadsheet used for data management would only be able to sort by rows or columns; there would be no room for data extraction or selection.

In order to get the most data management use from a SuperCalc4 spreadsheet, three areas need to be defined: an input range, a criterion range, and an output range. The input range is the part of the spreadsheet where the records are originally; where they would be entered, for example. The criterion range is a small section of the spreadsheet used to put in the text, numeric, formula, or logical conditions by which items in the input range of the file will be selected. When you use criteria to select items from the input range, the result of the selection shows up in the third defined area, the output range. The output range only needs enough space to accommodate the largest number of records that will be selected or chosen.

In order for the spreadsheet program to keep track of what data is where, exact-

match column labels (field names) must be included in the top row of each of the three ranges.

Once the ranges are all established, you can enter selection criteria in the criterion range to find, select, and extract records. The Find function does not move records to the output range as do both the Select and Extract functions.

When you use SuperCalc4 merely to sort data based on an element in a given column or row, the separate stages of declaring input, criterion, and output ranges are not necessary. You can sort on two criteria and then if you need further selection, you can narrow the data range and sort within previously ordered records on a new field.

As you can tell, using SuperCalc4 as a data manager is fairly complicated. The steps must be completed precisely and in the correct order. SuperCalc4's manner of handling this function is similar to 1-2-3's in both concept and execution.

**MACROS** SuperCalc4 spreadsheets can be partially or even fully automated through macros. The use of macros is essentially the saving of keystrokes that later

can be executed when called on. Writing macro programs can be tedious, but doing so saves time and ensures accuracy.

**SuperCalc4** has a convenient macro learn facility; you tell it to watch your keystrokes for a while and save them to a target area in the spreadsheet. You can also create a macro with an ASCII editor and execute it as an external file or incorporate it internally in the spreadsheet, a powerful technique for building a library of commonly used macros. When you invoke the macro the next time, it replays your exact keystrokes, errors included. Using macros can be intimidating, but the macro learn feature and the ability to use externally created and stored ASCII files make macros easier both to create and to work with.

**REPORTING** *SuperCalc4* has fairly flexible control of report formatting. You can control the number of copies, page layout, titles, headers, and footers, turn borders on and off, and send control codes directly to your printer to invoke special printing characteristics.

You can print a given file or range to the printer or plotter, to a disk print file, or to the console (your computer screen) to get a preliminary look at the output. You can also print a spreadsheet with the formulas showing for editing or auditing purposes.

**SIDEWAYS** *SuperCalc4* includes *Sideways*, the printer utility program that rotates spreadsheets 90 degrees and prints wide spreadsheets the long way on continuous form paper. To use *Sideways*, you first print a *SuperCalc4* range to a disk print file. You then exit *SuperCalc4* and use that program separately with the print file. You can also use *Sideways* with ASCII print files from other programs as well.

**FILE IMPORT AND EXPORT** *SuperCalc4* imports 1-2-3 files, both Releases 1A and 2.0, as well as XDIF, DIF, Comma Separated Values, Numeric, ASCII text, and *VisiCalc* files. Data exports in a choice of 1-2-3, XDIF, DIF, and Comma Separated Values. Data will generally import and export just fine. Macros from other programs will probably not work because of the difference in commands and function key use. There are extensive sec-

tions in the manual that cover the adjustments necessary to move files from 1-2-3 to *SuperCalc4* and vice versa.

*SuperCalc4* will also load and run files from previous versions of *SuperCalc*.

All file importing and exporting takes place from within the spreadsheet program. You don't have to go out to a transfer or conversion program as with many other programs.

**HARDWARE REQUIREMENTS** The minimum required system to use *SuperCalc4* is a dual floppy 256K PC or compatible running DOS 2.0 or later. Beyond that configuration *SuperCalc4* works with up to 8 megabytes of expanded memory and supports 8087 and 80287 coprocessor chips with a claimed calculation speed increase of up to ten times when using a coprocessor.

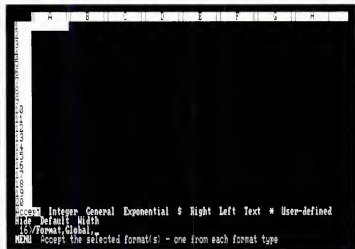
*SuperCalc4* works with monochrome, CGA, EGA, or Hercules-compatible graphics cards and monitors will also run on all normal data storage devices.

**INSTALLATION** Installing *SuperCalc4* is easy, especially if you use a hard disk drive. *SuperCalc4* is not copy protected (it never has been) and there is no concern about using key disks and cumbersome

and sometimes fatal installation programs. To set up *SuperCalc4* for use on a hard disk drive, all you do is copy the contents of disks onto the desired subdirectory. As soon as the files are copied you can begin using the program.

Setting up for use with a floppy disk system is a bit more complicated since the component programs will not fit on one floppy. When installing *SuperCalc4* to be used with floppy disks, the program checks available memory. If there is enough room the program will configure to load several program components into memory and still reserve 64K for workspace. This set of floppy disks is referred to as Fast work diskettes. If there is not sufficient memory, less can be loaded into memory; these disks are called Data-space diskettes. On subsequent startups with floppy disks you will be told if Data-space diskettes are desirable.

**LEARNING SUPERCALC4** Computer Associates provides several tools for learning the program. The tools include an introductory *10 Minutes to SuperCalc4*, a text-based tutorial with sample data files that covers much of the program and takes several hours to complete, keyboard templates, quick reference cards, and a con-



The command line shows the previous commands issued so you know how you got to your current place in the command structure. This screen also shows a two-line command menu.

## ■ SUPERCALC4

OUTPUT OPTIONS MENU: (\*Indicates options saved with /Global.Keep)

*Report Format	*Layout	*Paper
Formatted Yes	Page-length 66	Wait Yes
Contents No	Width 80	Auto-page No
	Left	Double No
Titles None	Top	Line-feed Yes
Horiz. None	Bottom	
Vert. None		*Borders Auto
	*Copies 1	Character

Headers

Footers

\*Setup String (default) (Output range is currently empty)

+ B1

Report Layout Paper Titles Copies Borders Headers Footers Setup

25/Output,Printer,Options...

MENU Exit Output Titles Menu

The Output Options menu lets you choose from and control several aspects of output sent to the printer, screen, or disk file.

	Qtr 1	Qtr 2	Qtr 3	Qtr 4
Sales	25000	28000	35000	25000
Costs	6000	6000	6000	6000
Profit	B5-B6	C5-C6	D5-D6	E5-E6
EXPENSES				
General & Admin	1500			
Consultant Fees	1200			
Total Expenses	SUM(B12:B13)			
Net Before Tax	B8-B15			
Income Tax	2000			
Net Income	B16-B17			
% of total	B19/F19*100			

+ B1

Width: 12 Memory: 138 Last Col/Row: G123

READY F1:Help F3:Names Ctrl-Break:Cancel

The Global Formula option lets you display formulas in their respective cells. As long as the formulas are not so long that they overlap each other, this ability makes it easier to edit and audit spreadsheets.

text-sensitive help-screen system.

It took me just under 20 minutes to work through *10 Minutes to SuperCalc4* and I've used and trained people in both the original *SuperCalc* and *SuperCalc3*.

That isn't too bad considering the exposure provided by the overview tutorial. One of the most powerful attributes of the *10 Minutes* tutorial is its use of the macro learn feature during the first part of the program

demonstration. *SuperCalc4*'s amicable introduction dispenses macrophobia by seemingly turning on a recorder and then replaying the keystrokes later.

A short guide is available on request entitled *Move Up to SuperCalc4 in 5 Minutes for 1-2-3 users*. The guide gives an overview of the differences between the programs and invites comparison. The user manual contains a complete command comparison chart and extensive tips for moving between *SuperCalc4* and *1-2-3*.

Computer Associates has a comprehensive user support program. All registered users get free phone support for the first six months after the product is purchased. Us-

■ This newest generation incorporates many features that make *SuperCalc4* a capable business and professional tool.

ers are encouraged to buy a Maintenance Program, which, for \$150 per year (if purchased within 90 days of buying the product, \$175 thereafter), provides free upgrades and priority and extended-hour technical support. A private bulletin board on The Source is devoted to Computer Associates products. Computer Associates also has a Corporate License Program for volume purchases of 25 copies or more with an increasing discount schedule.

*SuperCalc4* is a modern spreadsheet program. It admittedly is not the standard that *1-2-3* is, but there are hundreds of thousands of people using the various versions of *SuperCalc* for very good reasons. This newest generation is the most powerful yet and incorporates many features that make *SuperCalc4* a capable business and professional tool.

Bruce Brown is a principal consultant at Soft Industries located in Southington, Connecticut.

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193 Plus (IBM) ..... 558  
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P 341 ..... 695  
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7550 ..... 3349  
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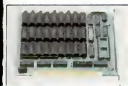
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# CLARION

## Fourth-Generation Programming

*Bruce Barrington has developed a significant new programming language—especially geared toward professional programmers who will appreciate Clarion's use of internal structures for screen, record, and report handling.*

**J**ust what the microcomputer world needs—a new language. That could be a legitimate first reaction to the release of Barrington Systems' Clarion—if it were nothing more than another BASIC, COBOL, or dBASE III. However, Clarion is more: a fully integrated programming environment as well as a new language. And some of its features are truly fourth generation; the language handles many programming tasks automatically.

**CLARION'S ORIGINS** Clarion was developed by Bruce Barrington, who started his own company in 1973 to produce a hospital information system that ran on a Four Phase 96K-byte machine. The Four Phase was the first machine released with solid-state memory. It also had a memory-mapped display scheme and networking capabilities.

Barrington wrote an operating system for the machine and a new language for system development. The language could generate menus and screens with simple procedures rather than pages of code. In short, the language was specifically designed to take advantage of the computer's memory-mapped video.

Barrington's hospital system was such a success that he sold out and retired in 1979. Then he realized that the PC could be a pretty good machine for business, and

that his experience with the Four Phase had made him knowledgeable about how to use memory-mapped video in advanced languages. In 1983, Barrington hired a few former colleagues from the hospital project and set to work developing what was to become Clarion.

Barrington's goal was to develop a fully integrated programming environment, automating as many tasks as possible. To achieve that goal, he set these initial guidelines for developing Clarion:

- A language shouldn't require the programmer to write something that isn't read by the compiler. For example, you shouldn't have to declare divisions, as is the case with COBOL.
  - Records should be flexible so that a record format can be changed well after the program is written, without necessitating massive rewrites or data reentry.
  - The language should invite a structure but give flexibility.
  - The best ideas of other languages should be incorporated. (Clarion looks more like PL/I than anything else. However, some of its keywords and syntax come right out of BASIC, others come from Pascal, and still others are recognizable as COBOL.)
  - If the compiler recognizes a simple error, it should fix it if there is no ambiguity.
- Clarion is written in C and assembly.

## ■ CLARION

The first part of the language-creation task was to write the C library, mostly in assembly. That took 3 years. The significance of the C library is that it allowed a single routine to be used in many places. Therefore, all of the Clarion utilities look alike and have the same user interface.

Clarion was designed for the development of commercial programs: that is, programs typically written in BASIC, Pascal, COBOL, or the programmable database products. It makes extensive use of built-in structures and procedures for the processing screens, reports, and keyed files that are the primary design elements of commercial applications.

Barrington's language does, in fact, help the programmer; if statements are concise and easily understood; if the programming environment is friendly; if punctuation is sparse and logical; if the compiler isn't fussy, and so forth. Clarion is a significant new language and it deserves at least passing consideration by serious micro applications developers.

**STRUCTURE** Figure 1 on the right shows several examples of Clarion programs. The .CLA extension represents a source-code file that can be created either on Clarion's editor or on your favorite line editor. Note that the basic program represented by PROG1.CLA contains three general sections. The program begins with declaration statements in which screens, reports, and record types are defined. Variables are typed here, too.

Next comes the Code section, which contains the executable statements of the program. The statements here, of course, make use of the screens, reports, procedures, functions and variables described in the declaration section above.

A routine in Clarion is similar to a sub-routine in BASIC. It is declared at the end of the Code section, it is called from the Code section, and it usually returns to the line following the calling line.

PROG2.CLA represents a more complex Clarion program structure. Note that a Map section precedes the global declarations. The purpose of this section is to tell the single-pass compiler to expect procedure and function declarations after the Code section. You will notice that procedures and functions have the same general

<pre> PROG1.CLA ----- PROG1  PROGRAM         declaration statements         CODE ROUT1  ROUTINE         executable statements =====  PROG2.CLA ----- PROG2  PROGRAM         MAP         PROC(PROC1)         PROC(PROC2)         FUNC(FUNC1),STRING         *         global declarations         CODE         executable statements PROG1  PROCEDURE(parameters)         declaration statements         CODE         executable statements PROG2  PROCEDURE(parameters)         declaration statements         CODE         executable statements FUNC1  FUNCTION(parameters)         declaration statements         CODE         executable statements </pre>	<pre> PROG3.CLA ----- PROG3  PROGRAM         MAP         MODULE('MEMB1')         PROC(PROC1)         FUNC(FUNC1),LONG         *         MODULE('MEMB2')         PROC(PROC2)         FUNC(FUNC2),REAL         *         global equates         global constants         global variables         CODE         statements ===== MEMB1.CLA ----- MEMB1  MEMBER('PROG3')         PROCEDURE(parameters) FUNC1  FUNCTION(parameters) ===== MEMB2.CLA ----- MEMB2  MEMBER('PROG3')         PROCEDURE(parameters) FUNC2  FUNCTION(parameters) </pre>
--	--

**Figure 1:** Several examples of Clarion programs are shown above. The .CLA extension represents a source code file that can be created on Clarion's editor or your favorite line editor. Note that the basic program represented by PROG1.CLA has three general sections. The program begins with declaration statements in which screens and reports and record types are defined. Variables are typed here too. PROG2.CLA represents a more complex Clarion program structure. Note that a MAP section precedes the global declarations. Its purpose is to tell the single-pass compiler to expect procedure and function declarations after the code section. Notice also that procedures and functions have the general structure of simple Clarion programs. PROG3.CLA represents the Clarion program structure used in large applications. A bookkeeping system, for example, might have a main program file similar to PROG3.CLA and 30 or 40 "member" programs similar to MEMB1.CLA and MEMB2.CLA.

structure of simple Clarion programs.

PROG3.CLA represents the Clarion program structure used in large applications. A bookkeeping system, for example, might have a main program file similar to PROG3.CLA and 30 or 40 "member" programs similar to MEMB1.CLA and MEMB2.CLA.

The Map section of PROG3.CLA "points" to member files, where various procedures and functions are found. Notice, too, that all equates, constants, and

variables declared in the main program are global to all members.

**PROGRAMMING ENVIRONMENT** Clarion's programming environment is made up of 11 utilities held together by a Director module. Included in this package are an editor (Editor), a compiler (Compiler), an interpreter (Processor), a screen-generation utility (Screener), a report generator (Reporter), a help-screen generation utility (Helper), a file-creation module



HOW MUCH WALLPAPER DO YOU NEED?

ROOM	WALLPAPER
Perimeter of room ? <input type="text"/>	Roll type ? <input type="text"/> Standard or European
Height of walls ? <input type="text"/>	Repeat ? <input type="text"/> Yes or No
Number of doors ? <input type="text"/>	How often ? <input type="text"/>
Number of double windows ? <input type="text"/>	Price per roll ? <input type="text"/>
you will need <input type="text"/> rolls of wallpaper at a total cost of <input type="text"/>	

Press Ctrl-Enter to restart or Ctrl-F10 to quit

HOW MUCH WALLPAPER DO YOU NEED?

ROOM	WALLPAPER
Perimeter of room ? <input type="text"/>	Roll type ? <input type="text"/> Standard or European
Height of walls ? <input type="text"/>	Repeat ? <input type="text"/> Yes or No
Number of doors ? <input type="text"/>	How often ? <input type="text"/>
Number of double windows ? <input type="text"/>	Price per roll ? <input type="text"/>
you will need <input type="text"/> rolls of wallpaper at a total cost of <input type="text"/>	

Press Ctrl-Enter to restart or Ctrl-F10 to quit

HOW MUCH WALLPAPER DO YOU NEED?

ROOM	WALLPAPER
Perimeter of room ? <input type="text"/>	Roll type ? <input type="text"/> Standard or European
Height of walls ? <input type="text"/>	Repeat ? <input type="text"/> Yes or No
Number of doors ? <input type="text"/>	How often ? <input type="text"/>
Number of double windows ? <input type="text"/>	Price per roll ? <input type="text"/>
you will need <input type="text"/> rolls of wallpaper at a total cost of <input type="text"/>	

Press Ctrl-Enter to restart or Ctrl-F10 to quit

HOW MUCH WALLPAPER DO YOU NEED?

ROOM	WALLPAPER
Perimeter of room ? <input type="text"/>	Roll type ? <input type="text"/> Standard or European
Height of walls ? <input type="text"/>	Repeat ? <input type="text"/> Yes or No
Number of doors ? <input type="text"/>	How often ? <input type="text"/>
Number of double windows ? <input type="text"/>	Price per roll ? <input type="text"/>
you will need <input type="text"/> rolls of wallpaper at a total cost of <input type="text"/>	

Press Ctrl-Enter to restart or Ctrl-F10 to quit

Wallpaper is a program that computes the number of rolls of wallpaper needed to decorate a room. Shown here are several examples of help screens attached to data entry fields. The main

Wallpaper screen was generated with Clarion's Screener utility, and the help screens were generated with Clarion's Helper utility. An experienced programmer could write Wallpaper in a few hours.

(Filer), a file sorter (Sorter), a file/record browse utility (Scanner), an import/export utility (Converter), and a cross-reference (Crossrefer) module.

The Director module lets you select active directories and subdirectories and execute a DOS shell. The other programming environment utilities can be accessed with the Director's point-and-shoot menus or function keys.

The function keys are always active whenever you are working in the programming environment. They enable you to jump around in the programming utilities quickly and to haul along the active file set. (The system remembers active source and program files even between programming sessions.)

Source code for Clarion programs is usually created with the Clarion Editor. The Clarion Compiler generates a pseudo-code that is interpreted by the Processor.

The editor—like all Clarion utilities—uses logical mnemonic Ctrl-key combinations to invoke various features. Ctrl-M, for example, invokes the move blocks of copy function, while Ctrl-S invokes the string-search function.

By definition the Clarion Editor is designed for writing source code. Its features reflect this. The system supports auto-indent and line-above duplication. The usual block moves, cuts, and copies are supported. Blocks of code can be put to disk files and the user can get files as well. The editor uses the Ins key to insert spaces into a

line, while the PrtSc key is used to toggle the insert/overwrite modes. (This takes a bit of getting used to.)

As seen in Figure 1, a Clarion program can include a single source-code file or many files. The master source-code file is called a program and has the word *program* in the first line of the file. Member files hold code (usually functions and procedures) called by the program file. The member files are declared in a Map section of the program source code. This enables the Clarion Compiler to build pseudo-code processor files (.PRO) without a link step.

Actually, the Compiler reads the program source code and its Map section and then creates a map file (.MAP), which contains all references to member files and

## ■ CLARION

global variables. (Any variable declared in the main program is global.) If you wish, the Compiler will create a listing that can be printed. It will also write all compilation errors and warnings to an error file (.ERR) that is used later by the Editor.

**EDITOR SIGNALS ERRORS** After compilation, the program can be run by invoking the Clarion Processor or, if there are errors, it can be edited with the Clarion Editor. In the latter case, the Editor will load the source file automatically and highlight the first error, along with an error message. Hitting Ctrl-E enables you to step sequentially through the errors and correct them.

In the first release of Clarion, the Compiler produced a *processor* object file (.PRO) for each program and member module. These files remained separate. In Version 1.1, the Processor loads the processor files, combines them, and writes out a bound (.BND) file. Thereafter, the Processor looks for a bound file at run time. If it finds one, it loads it and runs it. If it finds only .PRO files, it loads them and creates a .BND file. The Compiler deletes the .BND file when a program or member module is recompiled. A .BND file loads much faster than several .PRO files.

In early 1987, Clarion will introduce a new compiler module that takes processor files and generates familiar .EXE files. Originally, Clarion's designers liked the interpretive processor idea because it keeps program code relatively short. (The primary advantage of the pseudo-code approach is that it saves space. Library code that must be linked to each .EXE file can be kept separately in the Processor, thus saving space.) However, popular demand for .EXE files executable directly from DOS is forcing Barrington in that direction.

The Clarion Screener is a utility that allows you to design I/O screens and menus—and any other type of screen display—interactively. It's a screen painter with which you can draw lines, assign string constants and variables, and declare various display attributes. Once the screen is designed, Screener generates a screen structure that is automatically inserted into the declaration section of the program source code.

### ■ In early 1987, Clarion will introduce a new compiler module that takes processor files and generates familiar .EXE files.

The Clarion Reporter is similar to the screen generator. Rather than screens, the Reporter lets you "paint" printer reports interactively on the screen. The Reporter utility then generates a report structure that is inserted into the declaration section of the program source code.

The Clarion Helper is a utility similar to

the Screener except that it enables the user to paint help windows. Help windows can be assigned to screens or fields within screens or they can be linked together to form a running help file.

Clarion's use of screen, report, and help structures is a real plus for the programmer. Field handling and full-screen editing are accomplished automatically as is the help screen call-up logic. A screen is used like a procedure. It is simply called at the appropriate time. Information in input fields is simply accepted into variables.

**GENERATES MENUS** Menus are generated automatically by the Screener. Menus are read into a Case Of structure, which accomplishes selection. Menus are also called like procedures. These automatic screens are a result of excellent use of memory-mapped video and are a strong feature of Clarion.

Many of the Ctrl-key combinations and screen-manipulation techniques are simi-

## WHAT'S WRONG WITH OTHER LANGUAGES: A Personal View

What's wrong with other languages, and why do programmers need Clarion? Bruce Barrington, Clarion's designer, puts it this way. "Clarion has been on my mind since a FORTRAN compiler kicked me off for missing an 'H' count in a FORMAT statement. The author of the compiler must have thought I could count better than the computer. FORTRAN has grown up since those days, but you still can't follow a large program. COBOL is wordy: 'ENVIRONMENT DIVISION'.

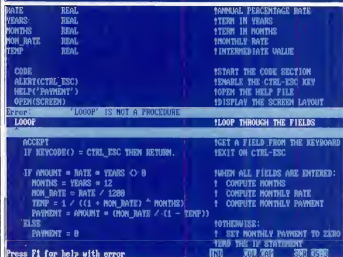
It takes two pages of code just to get started, and the implementations are Teutonic: 'STATEMENT 112 MIS-SION PERIOD - LEVEL E ERROR'. A polite compiler would supply a period if it knew where it belonged. Pascal is all BEGINs and ENDs and type declarations. Its syntax rules always seem to get in the way. C is great but the input/output functions aren't adequate. BASIC brings in the newcomers but doesn't take them anywhere. The database products aren't

really languages. They are batch files."

While these observations are strictly Barrington's opinions, they do suggest the directions that Barrington has taken in the design of Clarion thus far. In the forward to the Clarion manual, Barrington sums up the situation this way: "A programming language ought to help a programmer, requiring the fewest statements necessary to define a process clearly. Sequences that are always required should never be required. Some old notations are due for review: Why treat a memory-mapped display like a teletype? Why call loop statements Do While, For, Perform, or anything but Loop? Why don't compilers generate data-type conversions? Why so much punctuation? Why waste unused memory? And why are compilers so fussy?"

In the statements above, Barrington has not only defined the criteria for Clarion but also the yardsticks against which Clarion will be measured.

—Richard Aarons



Clariion's compiler generates error files, which are queried automatically by the Clariion editor. In this case, the compiler found a misspelled loop. Immediately after compilation, the editor is automatically loaded along with the source code. The double bar cursor moves to the first error, in this case—loop.

lar in the Helper, Screener, Reporter, and Editor. Learning a routine in one facility is helpful, generally, in using other utilities.

Additionally, the same keys and techniques are used in the applications created by the Screener and Helper. Therefore,

you end up with an intuitive feel for the end product because you've been using its techniques all along in the development phase.

The Clariion Filer, Sorter, and Scanner are used to create and manipulate record

files. The Filer creates empty data files based on the file structure you design with the Clariion programming language. (More on record types later.) The Sorter enables you to sort or reorganize the records in a Clariion data file and to delete any records marked for deletion. The Sorter will accept DOS-type wildcards, so you can process several files in one session.

The Scanner allows you to edit records in a Clariion data file. It's similar to the browse feature in many database systems. The Tailor utility lets you set system defaults such as monitor colors, default extensions, and source-code indentation.

Clariion's Converter and Crossrefer are new in Version 1.1 of the program. Converter allows you to import or export Clariion files to or from dBase II, dBase III, or BASIC file formats.

The Crossrefer cross-reference utility uses the program's Map structure and lists all global data references in the program module and in each member module. Also being developed at Barrington's shop is a new utility that will allow interactive query of Clariion files.

**DATA TYPES AND VARIABLES** The Clariion language supports a string type and these five numeric data types:

- Byte—One-byte unsigned integer (0-255).
- Short integer—Two-byte signed integer (-32,768 to 32,767).
- Long integer—Four-byte signed integer (nine significant decimal digits).
- Real—Eight-byte signed floating point



## FACT FILE

Clariion, Version 1.1  
Barrington Systems Inc.  
150 E. Sample Rd.  
Pompano Beach, FL 33064  
(800)354-5444  
List Price: \$395

**Requires:** 320K RAM, hard disk.  
**In Short:** Clariion is a new programming environment for serious applications developers. It incorporates such fourth-generation elements as internal structures for screen, record, and report handling. Not copy protected.

CIRCLE 845 ON READER SERVICE CARD

IBM's new 2,400 bps PC Modems  
give you an easy choice:

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The IBM 5842  
2,400 bps Modem.



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Both modems are compatible with the popular "AT" command set, as well as the IBM command set. And they have been tested for compatibility with leading PC communications software such as Crosstalk™ XVI, Microsoft® Access, Kermit, Smartcom® and Smartcom II®.

# Or

## The Automatic Modems

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### A Modem with a Memory of Its Own

The stand-alone IBM 5842 2,400 bps Modem offers some additional features. It can also send and receive data synchronously at speeds of 2,400 bps or 1,200 bps. You'll find extensive "Help" menus. A dial directory for 20 phone numbers. A log-on directory for five log-on sequences. A built-in pattern generator for self testing. Diagnostics implemented from the front panel as well as from the computer keyboard. And a complete array of LED Status Indicators to give you a quick visual check on what's happening.



Internal.  
The IBM  
Personal Computer  
2,400 bps Modem.

## Which One Is for You?

The internal IBM Personal Computer 2,400 bps Modem is designed to occupy a half slot in the IBM PC, XT, AT and 3270 PC.

The stand-alone IBM 5842 2,400 bps Modem is compatible with all models of IBM Personal Computers. And, in addition to the features mentioned above and its internal power supply, the significant difference is that a stand-alone modem can be moved from PC to PC more easily than an internal modem.

If you feel that 2,400 bps is more modem than you need, we also offer the stand-alone IBM 5841 1,200 bps Modem, and the internal IBM Personal Computer 1,200 bps Modem.

For the Authorized IBM PC Dealer nearest you—or for free literature on the IBM family of PC Modems—call 1 800 IBM-2468, Ext. 141/EM. Or you can contact your IBM marketing representative.

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## ■ CLARION

(15 significant decimal digits from 10\*\*307 to 10\*\*-308).

■ (Numeric) string—Numeric constant or picture format (same range as real).

Clarion's floating-point type combined with a Round function provides up to 15 accurate significant digits for accounting applications. Variables are usually typed in the declaration section of a program. However, like BASIC, they may be declared implicitly. For example:

■ label# is a LONG variable.

■ label\$ is a REAL variable.

■ label\* is a STRING(32) variable.

Notice the use of the dollar sign for real and double quotes for a string. This notation may confuse the BASIC programmer for a minute, but it's entirely logical when you think about it.

Variables can have up to 12 characters in their names, including the letters A through Z, numerals 0 through 9, and the underscore character. A "pre" attribute is available to provide a variable-name prefix, which may be used to distinguish identical variable names occurring in different structures (screen, file, report). This happens sometimes when variables are introduced from record libraries. For example, ACCT\_NO may occur in both a master and detail record. Statements using doubly declared variables are flagged as errors in the compiler listing. Arrays are declared similarly to the BASIC or Pascal declaration statement: for example, DIM(10). A dimension attribute may have up to four dimensions. An array may be passed as a parameter of a procedure or function.

Clarion uses the traditional math and logical operators with the traditional evaluation scheme. The plus sign (+) is used for addition. The ampersand (&) is used for string concatenation, which is pretty straightforward.

However, the assignment statement provides some interesting variations. The equal sign (=) is used for assignments as in this statement:

```
MON_BAL = CUR_BAL + LST_BAL
```

A common use of assignment statements looks like this:

```
A = A + 1 or A = A - 1.
```

Clarion will handle an assignment such as that one or will accept it in a statement

made in this shorthand form:

```
A += 1 or A -= 1.
```

These do the same thing as the statement above.

**STRUCTURES** Barrington promised simplicity in Clarion's control structures, and that he certainly delivered. The LOOP structure is a good example. Consider the following five forms of the loop statement:

```
label LOOP
    statements
END
```

```
label LOOP count TIMES
    statements
```

```
END
label LOOP i=initial TO
    limit BY step
    statements
END
label LOOP UNTIL logical
    exp
    statements
END
label LOOP WHILE logical
    exp
    statements
END
```

(Note that the END can be replaced by a dot "." placed anywhere in a Clarion pro-

## RESERVED WORDS and FUNCTIONS

### Reserved Words

AND	END	OMIT	THEN
BREAK	EXECUTE	OR	TIMES
BY	EXIT	OROF	TO
CASE	FUNCTION	PROCEDURE	UNTIL
COPY	GOTO	PROGRAM	WHILE
CYCLE	IF	REPEAT	XOR
DO	LOOP	RETURN	
EJECT	MEMBER	ROUTINE	
ELSE	NOT	SIZE	
ELSIF	OF	SOURCE	

### FUNCTIONS

ABS	CLIP	KEYCODE	REFERR
ACOS	CLOCK	LEFT	RIGHT
AGE	COL	LEN	ROUND
ALL	COS	LEGL0	ROW
ASIN	DATE	LOGE	SIN
ATAN	DAY	LOWER	SQRT
RAND	DEFORMAT	MAXIMUM	SUB
BOF	EOF	MEMORY	TAN
BOR	ERROR	MONTH	TODAY
BSHIFT	FIELD	NUMERIC	UPPER
BXOR	FORMAT	OMITTED	VAL
BYTES	INRANGE	PATH	YEAR
CENTER	INSTRING	POINTER	
CHOICE	INT	RANDOM	
CHR	KEYBOARD	RECORDS	

**Figure 2:** The list of keywords and functions above will give you some feel for the programming features available in Clarion.

```

119 1 CODE
120 1 START OF CODE SECTION
121 1 OPEN (DISPLAY)
122 1 IDISPLAY SCREEN
123 1 SELF('PAPER.HLP')
124 1 INITIATE HELP SCREENS
125 1 ALERT(CTRL_ESC,CTRL_ENTER)
126 1 ERASE THE CTRL-ESC KEY
127 1 LOOP
128 1 MAIN LOOP
129 2 ACCEPT
130 2 IGET A FIELD FROM THE KEYBOARD
131 2 IF KEYCODE() = CTRL_ESC THEN RETURN.
132 2 QUIT ON CTRL-ESC
133 2 IF KEYCODE() = CTRL_ENTER
134 2 IRESTART ON CTRL-ENTER
135 2 ERASE SCREEN
136 2 ERASE ALL THE FIELDS
137 2 ROLLS = 8
138 2 SEND NUMBER OF ROLLS
139 2 COST = 8
140 2 ZERO TOTAL COST
141 2 SELECT(7PERIN)
142 2 START ON THE FIRST FIELD
143 2 CYCLE
144 2 LOOP AGAIN
145 2 CASE FIELD()
146 2 EDIT THE FIELD ENTERED
147 2 OF WALL
148 2 EDIT WALL HEIGHT
149 2 IF WALL + 100 > 11
150 2 MORE THAN 11 INCHES
151 2 ERASE
152 2 YES - SOUND KEYBOARD ALARM
153 2 SELECT(7)
154 2 REENTER THE FIELD
155 2 ELSE
156 2 INCHES = INT(WALL/100)*12 + WALL%100

```

```

157 2 ICONVERT FT/IN TO IN
158 2
159 2 DF TYPE
160 2 EDIT WALLPAPER TYPE
161 2 EXECUTE CHOICE()
162 2 WALLPAPER TYPE
163 2 AREA = STANDARD
164 2 SET AREA COVERED BY STANDARD
165 2 AREA = EUROPEAN
166 2 SET AREA COVERED BY EUROPEAN
167 2
168 2 OF TREPAT
169 2 EDIT REPEATED PATTERN
170 2
171 2 HEIGHT = INCHES
172 2 IF REPEAT = 'No'
173 2 IS THERE A REPEAT?
174 2 ERASE(7EVERY)
175 2 ERASE REPEAT LENGTH
176 2 SELECT(7PRICE)
177 2 AND SKIP THE FIELD
178 2
179 2 OF 7EVERY
180 2 EDIT REPEAT LENGTH
181 2 IF REPEAT = 'EVERY' <> 0
182 2 IF REPEAT DOESN'T FIT EVENLY
183 2 HEIGHT = INT(INCHES/EVERY+1) * EVERY
184 2 ROUND HEIGHT TO NEXT REPEAT
185 2
186 2 DF 7PRICE
187 2 EDIT PRICE PER ROLL
188 2 ROLLS = PERIN * HEIGHT / AREA / 12
189 2 COMPUTE NUMBER OF ROLLS
190 2 - INT(DOORS/2) - WINDOWS
191 2
192 2 COST = ROLLS * PRICE
193 2 COMPUTE TOTAL COST
194 2
195 2 END CASE, & MAIN LOOP

```

## SOURCE CODE FOR PRODUCING THE WALLPAPER PROGRAM

Shown above is the Wallpaper program, which is written in Clarion. The Clarion code for Wallpaper is actually very short. Line 119 displays a screen declared earlier. Lines 123 to 160 accept input to screen fields and compute the required number of wallpaper rolls. All screen editing and cursor manipulation and help screen links are

provided automatically by the compiler. Writing the Clarion source code for the main screen and the help screens could take an experienced Clarion programmer the better part of a morning. Writing similar screens and cursor control routines and help links would take the better part of a week in most other languages.

gram. The dot is used in the examples of Clarion programs in Figure 1.)

In the first loop statement example given, you will note that Form 1 loops until it is interrupted by a BREAK, RETURN, or EXIT statement. Form 2 simply runs the counter and then stops. Form 3 cycles for each value if "i". It is usually used to manipulate arrays. Both forms 4 and 5 are conditional loops. The WHILE or UNTIL condition is set by first testing the variable prior to each run.

While Clarion has enough control structures to avoid GOTOs, Clarion gives the programmer the choice with the EXECUTE structure. In fact, EXECUTE is really a good example of Clarion's simplification of structures that are taken from other languages. An EXECUTE structure looks like this:

```

label EXECUTE expression
statement 1
statement 2
statement 3
statement 4
statement n
END

```

The statement that is executed depends on the value of the expression. This statement is similar to (but certainly cleaner than) BASIC's ON ... GOSUB, COBOL's GO TO ... DEPENDING ON, and FORTRAN's computed GO TO. It's normally used to dispatch procedures directly from a menu screen.

The list of keywords and functions that appears in Figure 2 will give you a feel for the programming features that are available in Clarion.

**FILE PROCESSING** Clarion files support sequential, direct, and indexed access methods. Clarion's file utility programs are used to create, back up, restore, sort, query, and modify Clarion files.

Clarion data files contain descriptive headers (automatically created by the programming system) followed by fixed-length records. The header contains variable name and type of each data field in the record. It also contains a description of each key in the records.

Keys can consist of multiple noncontiguous fields and a field can belong to more than one key. Key files are updated automatically as necessary whenever a record is added, deleted, or modified. Keys can be used to process records sequentially or randomly.

Records are handled as units in the pro-



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## ■ CLARION

gram through the use of record structures similar to Pascal or COBOL. Procedures are used to manipulate records within the program. For example, files are OPENed or CLOSEd. Pointers are SET. You can ADD or DELETE a record as well as access the NEXT record or the PREVIOUS record.

The Clarion programmer can open as many files as he wishes. DOS versions 2.0 and 2.1 limit open files to 99. DOS 3.0 to 3.2 limit open files to 255. Clarion itself imposes no limits.

Clarion also provides direct access to standard DOS files. Again, procedures are used to create, remove, rename, open, and close DOS files.

The Name function returns a string containing the device, path, and filename of a file or DOS structure or the device name associated with a report structure. Thus, directory manipulation from within programs is relatively simple.

Barrington Systems has recently introduced a series of three new language extension modules, each available as a separate option priced under \$30. These language extension modules are libraries in the form of source and member files. The functions and procedures contained in the modules can be used simply by mentioning them in the Map section of a program while making sure to keep the parameter-passing variables straight. These new modules are called Finance1, DOS1, and FILE1.

**DISKS AND DOCS** Clarion is distributed on eight disks that total about 2.5 megabytes. The latest version of Clarion is not copy protected. The original version used a screwball scheme that required you to place a pass-through connector plug in any parallel port on your machine. The device was invisible to data moving through the port. However, its absence would cause early versions of Clarion to fail at the first menu. Barrington has upped the price by \$100 (to \$395) and done away with all copy protection.

Documentation currently comes in three binders: a reference manual, a system overview, and a collection of sample listings and exercises. The documentation is certainly adequate for Clarion's target market—serious applications program-

■ Clarion is a real, live, mostly fourth-generation programming language. It is especially designed for the serious (if not the professional) applications designer.

mers—but will be a bit mysterious to newcomers to programming.

**FINAL THOUGHTS** It would take a book (or actually three, in this case) to fully describe a programming language, so I'll leave you instead with a few of my thoughts about Clarion.

First, Clarion is a real, live, mostly fourth-generation programming language. It is designed for the serious (if not the professional) applications designer.

Clarion's fourth-generation elements are concentrated in its use of internal structures for screen, record, and report handling. And, of course, that's just where the serious applications designer needs the most help. I predict that Clarion is going to do well—particularly with those professional programmers who are now reaching the limits of their programmable database-type systems.

Clarion should appeal to COBOL programmers who are tired of getting writer's cramp and Pascal programmers who are going absolutely bonkers with all those Begins and Ends.

Clarion will be particularly popular, I think, with those neaticks who like the idea of keeping all source-code elements moving back and forth between integrated utilities (the filer, editor, screener, and so forth). In short, if you are a serious applications programmer, Clarion should be in your programming arsenal.

Richard Aarons is a contributing editor of PC Magazine.

# Awards for TECHNICAL EXCELLENCE

## PC MAGAZINE HONORS THE INDUSTRY

As an industry, the personal computer business does a less-than-perfect job of recognizing the enormously creative and technically talented people behind the development of the best PC products introduced every year. Sure, it's nice for the developer of a successful product to make a little money, perhaps have the product appear on one or another of the top-seller lists, and possibly gain the respect of their peers in the technical community. But true recognition is defined by publicly attaching the names of those responsible for a product to their accomplishments.

Being the magazine that knows more about personal computer products than any other, we decided 2 years ago that *PC Magazine* was obligated to give developers the kind of recognition that they deserve for their efforts on behalf of the per-

sonal computer community at large.

In our first annual awards at Spring Comdex in Atlanta, we honored the unsung heroes and entrepreneurs of the industry (see "In Praise of Unsung Heroes," *PC Magazine*, Volume 4 Number 16). In our second annual awards last April 28, *PC Magazine* recognized the people and products we thought represented the best technical development efforts in the industry during 1985. The presentation of the awards at Georgia Tech's computer lab, again during Spring Comdex in Atlanta, focused on those who actually designed and developed the product rather than on the marketing or management people (see "The Envelope, Please," *PC Magazine*, Volume 5 Number 14).

What an idea! We discovered that the technical people behind the product were thrilled to be given public recognition for their work. And we discovered that the

nominated companies were just as thrilled to have their technical people recognized.

When it came time to plan this year's awards for products developed during 1986, we decided to turn up the applause meter. Instead of waiting 4 or 5 months after the close of the year, we scheduled the awards ceremony for Fall Comdex in Las Vegas. Then we added a little glitz and glitter by making it an entertainment-packed black-tie event. What we ended up with was a night that the developers of 12 highly sophisticated products will remember for a long time.

On November 10, the opening night of Comdex, *PC Magazine* gathered some 1,000 of the leading management and technical personalities in the industry at the elegant Alexis Park Resort Hotel, a hotel distinguished by the absence of a casino or any gambling activity. Many of the attendees took the event seriously enough to don

formal attire. Others came in their finest Don Johnson regalia. The contrasts that characterize our industry were there in full measure, but the common thread was passionate concern for the quality of their products.

When the third annual awards presentation began, the winners were still a secret held closely by the top staff of the magazine. Indeed, the developers of the more than 51 products nominated for awards came to the ceremony not knowing whether they were the winners. After screening "Technology, Business, and the Press: *PC Magazine* and the New Era of Partnership," a videotape outlining the history of the relationship between technology, business, and the press in the personal computer industry, we rapidly got down to business. The magazine's senior staff and contributing editors—publisher William Lohse, editor-in-chief Bill Machrone, executive editors Paul Somerson and Bill Howard, PC Labs director William G.

Wong, West Coast editor Stewart Alsop, and contributing editors John C. Dvorak, Jim Seymour, Frank Derfler, Jr., and Stephen Manes—presented the awards in each of the nine product categories. Individual presentations included a brief overview of events in that category during 1986 and computer-animated videos, generated from West End Film's animation software, about each of the finalist's products. Then, to a drumroll, the presenter opened an envelope and announced the names of the product, company, and developers of the winning product, followed by a few remarks from each winner. A surprise special award for the person who has

had the greatest impact on the technical direction of the industry in 1986 was given to Bill Gates, chairman of Microsoft.

The ceremony closed with a laser light show, produced by Science Faction Corp., accompanied by the computer-synthesized original music of Roger Powell from his album, "Architecture."

As we look forward to presenting the awards for 1987, we know we've found a way to truly bring recognition to the people behind the scenes who make PCs come to life and enrich our work.

Fall Comdex in Las Vegas is an annual, 4-day ritual that's attended by more than 80,000 people looking for new product introductions and what direction the industry will take in the coming year. For most, it's a way to check the pulse and vitality of the industry as a whole. On the following pages, we present profiles of the products and developers who have advanced the state of the art and expanded the horizons of personal computing in 1986. They are



Our third annual awards recognize the people and the products behind the personal computer industry's major advancements of 1986.



*PC Magazine* editor Bill Machrone honors Microsoft's Bill Gates with a special award.

the heart of the business and we salute the nominees, finalists, and winners of *PC Magazine's* Third Annual Awards for Technical Excellence.

## NOMINEES

Compaq Deskpro 386/  
Compaq Computer Corp.

PC's Limited 286/12/  
PC's Limited

Tandy 3000 HD/Tandy Corp.

## FINALISTS

Compaq Deskpro 386/  
Compaq Computer Corp.  
Gary Stimac

PC's Limited 286/12/  
PC's Limited  
Jay Bell

Tandy 3000 HD/Tandy Corp.  
Tandy Research and  
Development Group

# DESKTOP COMPUTERS

Gary Stimac

COMPAQ DESKPRO 386

Compaq Computer Corp.

**I**t was really no contest. Compaq was the first to market with an 80386-based computer. And what a computer it is! Fully compatible with earlier hardware and software, it paves the way to future operating systems and future applications software. Typical of the Deskpro 386's heads-up design is its memory management, which emulates extended, expanded, and enhanced expanded memory. It keeps existing programs alive while running twice as fast.

The Deskpro 386 does it with class, with speed, and with sound hardware and software design. In a market where it often takes a few tries to get a new product right, Compaq has clearly done it right the first time. Gary Stimac, Vice President of Systems Engineering, oversees a team of systems development professionals providing support and direction for company-wide product development efforts. He joined the company in February 1982 as a systems engineer and later served as a director and vice president of engineering. Stimac has led the development of Compaq's entire desktop

line. Prior to joining Compaq, Gary Stimac was with Texas Instruments for 9 years, his last post as head of the company's Winchester disk drive development group. Stimac, 35, has a B.S. in electrical engineering from the Milwaukee School of Engineering and lives with his wife and two children in Houston, Texas.

Compaq's Deskpro 386 beat  
the competition and established  
the company as a new leader.



# GRAPHICS HARDWARE

T. Nishimata T. Inoue

NEC MULTISYNC

NEC Home Electronics Inc.

The NEC MultiSync takes a tough job and makes it look easy. It adapts itself to video signals from virtually any source up to 800 by 500 pixels, including some that haven't been invented yet. The NEC MultiSync combines TTL and analog monitors in one amazingly compact package. It even has a text-only mode in which you can assign the text any of 16 colors. The best thing we can say about the MultiSync is that you don't have to think about it. No matter what you plug it into, it works and it looks great. If producing a self-synchronizing monitor were easy, everyone would be doing it. Even NEC underestimated the difficulty: it thought it had a 4-to-6-month lead on the market; it turned out to be closer to a year.

Mr. T. Nishimata is an Electrical Engineer for the MultiSync monitor development. He has been with NEC for 12 years. His personal goal of developing products that are both profitable and solve consumer needs has been realized with the introduction of the MultiSync monitor. Mr. Nishimata was one of the principal designers of the MultiSync product development and strategy. He graduated from the Kanazawa University in Japan and is 34 years old.

The NEC MultiSync packs high technology into a compact package.

Mr. T. Inoue, also Electrical Engineer, is the other principal designer of the MultiSync monitor. He has been with NEC for 9 years and was stationed in the U.S. for 1 year while he worked closely with the NEC Home Electronics Marketing and Product Planning team developing the MultiSync. Mr. Inoue graduated from Sasebo Technical College in Japan and is 29 years old.



## NOMINEES

Hercules Graphics Card Plus/  
Hercules Computer  
Technology

Intel 82786/Intel Corp.

NEC MultiSync/NEC Home  
Electronics Inc.

Paradise AutoSwitch/  
Paradise Systems Inc.

Multiscan/Sony Corporation  
of America

TI 34010/Texas Instruments

EVA/480/  
Tseng Laboratories Inc.

VEGA Deluxe/Video-7 Inc.

## FINALISTS

Hercules Graphics Card Plus/  
Hercules Computer  
Technology  
Van Suwannukul

NEC MultiSync/NEC  
Home Electronics Inc.  
T. Nishimata  
T. Inoue

VEGA Deluxe/  
Video-7 Inc.  
Patrick Milligan  
Greg Reznick  
Don Bryson

# Peruse our pano

- ✚ denotes IBM-AT compatibility.  
✚ denotes IBM-PCjr compatibility.  
(call for specific requirements)

## SOFTWARE

We only carry the latest versions of products.  
Version numbers in our ads are current at press time.

<b>Alpha Software</b> (not copy-protected)	
✚ Keyworks 2.0	\$49.
✚ Alpha/Three 1.0	223.
<b>Application Techniques</b>	
✚ Pizzazz 1.0 (not copy-protected)	35.
<b>Ashton-Tate</b> (not copy-protected)	
✚ dBase III Plus 1.1	call
✚ dBase III Plus 1.1	call
✚ Sign-Master 5.1 (copy-protected)	157.
✚ Diagram-Master 5.01 (copy-protected)	207.
✚ Cheri-Master 6.2 (copy-protected)	237.
✚ Map-Master 1.0 (copy-protected)	245.
✚ MultiMate 3.31	call
✚ MultiMate Advantage 3.6	call
<b>Best Programs</b> (not copy-protected)	
✚ PC/Tax Cut (1987 version for 1986 taxes)	49.
<b>Bible Research</b> (not copy-protected)	
✚ The Word 3.1 (KJV Bible)	159.
✚ The Word 3.1 (NIV Bible)	159.
<b>Borland International</b> (not copy-protected)	
✚ Turbo Tutor 2.0	24.
✚ Turbo Database Toolbox 2.0	41.
✚ Turbo Graphics Toolbox 1.0	41.
✚ Turbo Editor Toolbox 1.0	41.
✚ Turbo Lightning 1.0	59.
✚ Word Wizard 1.0	41.
✚ Turbo Pascal 3.0 w/BCD & 8087 support	59.
✚ Turbo Pascal w/Turbo Tutor	75.
✚ Turbo Prolog 1.1	59.
✚ Turbo Family Jumbo Pack	187.
✚ Sidekick 1.5	51.
✚ Traveling Sidekick 1.0	43.
✚ Traveling Sidekick w/Sidekick	73.
✚ Reflex 1.1	87.
✚ Reflex Workshop 1.0	41.
✚ Superkey 1.1	41.
<b>BPI Accounting</b> (not copy-protected)	
✚ General Accounting C.13	289.
<b>Breakthrough</b> (not copy-protected)	
✚ Timeline 2.0	239.
<b>Broderbund</b> (copy-protected)	
✚ Print Shop	35.
✚ Graphics Library 1	22.
✚ Graphics Library 2	22.
<b>Computer Associates</b> (not copy-protected)	
✚ SuperCalc 4.1.0	279.
<b>Consumers Software</b> (not copy-protected)	
✚ Spreadsheet Auditor 3.0 (check your work)	89.
<b>Dec Software</b> (not copy-protected)	
✚ Dac Easy Port	19.
✚ Dac Easy Mate	36.
✚ Dac Easy Payroll	22.
✚ Dac Easy Accounting	45.

## PC Connection Software Special through January 31, 1987

### STONE & ASSOCIATES

- ✚ 2nd Math  
✚ Algebra • Level 1

Are you the only one who ever has fun with a computer? Do your kids think that all it does is spreadsheets and checkbooks? These two educational programs for children not only teach them how to add, subtract, and so forth, but they're also fun, colorful, and the kids will actually learn something!

- From Stone & Associates, leaders in quality educational software
- Animated characters, colorful objects, playful sounds
- Big, bold graphics that can be easily seen and understood
- Increasing levels of difficulty to provide a continuing challenge
- Great fun for children of all ages

For the IBM PC, XT, AT, PCjr  
2nd Math (requires CGA, BASICA or GW-BASIC) \$24.  
Algebra • Level 1 (requires CGA, BASICA or GW-BASIC) \$24.

### Executive Systems

- ✚ XTREE 2.0 37.
- ✚ Hot 1.0 (DOS utility) 41.
- ✚ 5th Generation (not copy-protected) 41.
- ✚ Fastback 5.13 97.
- ✚ Funk Software (not copy-protected) 97.
- ✚ Sideways 3.11 39.
- ✚ Generic Software (not copy-protected) 69.
- ✚ Generic CADD 2.0 69.
- ✚ Harvard Associates (not copy-protected) 89.
- ✚ PC LOGO 2.0 89.
- ✚ Infocom (not copy-protected) 59.
- ✚ Cornerstone 5.2 59.
- ✚ Lifetree (not copy-protected) 59.
- ✚ WordsWriter Deluxe Plus 1.0 69.
- ✚ Words and Figures 1.0 129.
- ✚ WordsWriter 3.1.0 147.

### Micro Education (MECA)

- ✚ Managing Your Money 3.0 115.
- ✚ Managing the Market 1.0 85.
- ✚ Micropro (not copy-protected) 179.
- ✚ WordStar 3.31 259.
- ✚ WordStar Propak 3.31 259.
- ✚ WordStar 2000 Plus Release 2 285.
- ✚ Microfilm (not copy-protected) call
- ✚ R base 5000 1.01 359.
- ✚ R base System V 1.0 359.

### Microsoft

- ✚ Windows 1.03 865.
- ✚ Multiplan 2.01 119.
- ✚ Microsoft Chart 2.02 197.
- ✚ Microsoft Word 3.1 279.
- ✚ Microsoft Project 3.0 239.
- LANGUAGES**  |- ✚ Quick Basic 2.0 59.
- ✚ Macro Assembler 4.0 97.
- ✚ Fortran Compiler 3.31 229.
- ✚ C Compiler 4.0 279.

### Microsoft (not copy-protected)

- ✚ Remote 1.3 95.
- ✚ Crosstalk XVI 3.61 95.

### Migent Software

- ✚ Ability 1.0A 65.

### Monogram

- ✚ Dollars & Sense 2.0 105.

### Nentucket Software

- ✚ Clipper (Autumn '86) 349.

### Paperback Software

- ✚ VP-Planner 1.0 57.
- ✚ VP Info 1.0 57.

### Personics

- ✚ SmartNotes 1.4 49.

### Peter Norton

- ✚ Norton Commander 1.0 36.
- ✚ Norton Utilities 3.1 59.

### Quertardeck

- ✚ DESQView 1.3 65.

### Simon & Schuster

- ✚ Webster's New World Speller 1.3 39.
- ✚ Webster's New World Thesaurus 1.0 43.
- ✚ Webster's New World Writer 1.01 (includes Thesaurus & Speller) 109.

### Softlogic Solutions

- ✚ Double DOS 4.0 (PC concurrency) 33.
- ✚ Software Carousel 2.0 33.
- ✚ Disk Optimizer 2.0 35.

### Software Publishing

- ✚ PFS First Choice 1.0 89.
- ✚ Personal Publisher 1.0 109.
- ✚ Professional Write 1.0 119.
- ✚ Professional File 1.0 149.
- ✚ Harvard Presentation Graphics A.01 245.
- ✚ Harvard Total Project Manager 1.12 289.

### Springboard

- ✚ Certificate Maker 34.
- ✚ Newsroom 35.
- ✚ Clip Art Volume 1 (for Newsroom) 19.
- ✚ Clip Art Volume 2 (for Newsroom) 25.
- ✚ Newsroom • Pro (not copy-protected) 79.

### Symantec

- ✚ Q & A 2.0 call

### True BASIC, Inc.

- ✚ True BASIC 2.0 109.
- ✚ True BASIC Libraries each 32

### Turner Hall

- ✚ SQZI 1.5 (for Lotus compactness) 49.
- ✚ Note-It 2.0 (notes on spreadsheets) 49.

### WordPerfect Corp.

- ✚ WordPerfect Library 59.
- ✚ WordPerfect 4.2 239.

For the IBM-PC (XT & AT) Exclusively.

# PC CONNECTION®

# ply of products.

## TRAINING

- ATI (copy-protected)**
- **SKILL BUILDER PROGRAMS**
  - PC-DOS MS-DOS
  - IBM-PC BASIC ... each \$33.
  - **TRAINING POWER PROGRAMS**
  - Lotus 1-2-3 Wordperfect dBase III Plus
  - WordStar Displaywrit 3 ... each 43.
  - Individual Software (copy-protected)**
  - The Instructor II ... 26.
  - Professor DOS ... 33.
  - Tutorial Set (both items above) ... 49.
  - Typing Instructor II ... 26.
  - Training for Lotus 1-2-3 (for vers. 1A & 2) ... 37.
  - Microsoft (not copy-protected)**
  - Learning DOS (for any version) ... 33.
  - Simon & Schuster (not copy-protected)**
  - Typing Tutor III 1.5 ... 33.

## EDUCATIONAL

All educational programs listed are copy-protected except where noted.

- Berron's**
- Computer SAT ... 35.
  - Designware (reqs. CGA)**
  - Spellcopter (ages 6 to adult) ... 22.
  - Edware (reqs. CGA)**
  - Algebra 1,2,3, or 4 ... 22.
  - Harcourt Brace Jovanovich**
  - Computer SAT ... 49.
  - Stone & Associates (reqs. CGA)**
  - My Letters, Numbers, Words (ages 1 to 5) ... 27.
  - Kids Stuff (ages 3 to 8) ... 27.
  - True BASIC, Inc. (not copy-protected)**
  - Calculus ... 32.
  - Pre-Calculus ... 32.

## RECREATIONAL

All recreational programs listed are copy-protected except where noted.

- Blue Chip**
- Managing for Success (American Dream) ... 36.
  - Millionaire ... 36.
  - Electronic Arts (reqs. CGA)**
  - Starflight ... 42.
  - Hayden Software**
  - Sargon III (highest rated Chess program) ... 32.
  - Infocom (not copy-protected)**
  - Enchanter ... 36.
  - Leather Goddesses ... 36.
  - Moonmist ... 24.
  - Zork I ... 24.
  - Zork II ... 24.
  - Zork III ... 24.
  - Invisibles (hint booklets). Specify game ... 6.
  - Microleague Sports (reqs. CGA)**
  - Microleague Baseball ... 25.
  - Microprose (reqs. CGA)**
  - F-15 Strike Eagle ... 22.
  - Silant Service ... 22.

## PC Connection Hardware Special

through January 31, 1987

### EPSON ... 1 year LQ-1000

Aren't you glad you waited to buy a printer? Epson's latest printer is another winner. Crisp, high-quality dot matrix printing with Epson's renowned reliability and compatibility. Loads of standard features, and some surprising options, too.

- 24-pin printhead for superb near-latter quality print
- 180 cps (draft mode, 60 cps NLQ mode) for fast, accurate results
- Supports all standard Epson character fonts, including proportional and 15 cpi
- Both Canonics parallel and RS-232C serial interfaces standard
- Options include tractor feed, cut sheet feeder, Identity Modules for extended compatibility, and Font Modules for additional print fonts.

For the IBM-PC, XT, & AT ... \$747.

- Microsoft (reqs. graphics brd.)**
- Flight Simulator 2.12 ... 32.
- Mindscape (reqs. graphics brd.)**
- Balance of Power (avoid nuclear war) ... 30.
- 1Step Software (reqs. CGA)**
- Golf's Best (Pinehurst or St. Andrews) ... 19.
- Parlor Software (not copy-protected)**
- Bridge Parlor (best Bridge simulation) ... 49.
- Sierra On-Line (reqs. CGA)**
- Space Quest ... 32.
- King's Quest I ... 33.
- King's Quest II ... 33.
- King's Quest III ... 33.
- Simon & Schuster**
- Star Trek/Kobayashi ... 27.
- Spectrum HoloByte (reqs. CGA)**
- Orbiter (Shuttle simulation) ... 27.
- GATO ... 27.
- Sublogic (reqs. graphics brd.)**
- Night Mission Pinball ... 29.
- Jet ... 33.
- Scary (airport) disks for Jet ... each 15.
- XOR (not copy-protected)**
- NFL Challenge (be the coach) ... 79.

# 1-800-243-8088



**PC Connection**  
6 Mill Street  
Marlow, NH 03456  
603/446-3383

325M

## HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

### AST Research ... 2 years

- All boards listed (except Piggyback) include a FREE copy of DESQview
- SoxPakPlus 64k C/S/P ... \$ 169.
- SoxPakPlus 384k C/S/P (fully populated) ... 209.
- Advantage 128k S/P (upgrades to 1.5 Mb) ... 369.
- SoxPakPremium 256k C/S/P
- (upgrades to 1 Mb or 2 Mb w/Piggyback) ... 319.
- SoxPakPremium Piggyback Board 256k ... 189.
- Advantage Premium 512k S/P
- (upgrades to 1 Mb or 2 Mb w/Piggyback) ... 469.
- Advantage Premium Piggyback 512k ... 289.
- RAMPagel 256k (upgrades to 2Mb) ... call
- RAMPagel AT 512k (upgrades to 2Mb) ... call
- AST Premium series boards and RAMPagel boards support EMS and fully support EEMS.

### Amdek ... 2 years

- Video 310A mono monitor (amber) ... 159.
- Color 722 - EGA compatible ... 519.

### Computable ... lifetime

- 9-to-25 Pin Serial Converter cable ... 19.
- AT-to-Smartmodem cable (9 feet) ... 19.
- 15-foot Parallel Printer cable ... 27.
- 2-Position (AB switch box) ... 39.
- 3-Position (ABC switch box) ... 65.

### Cuesta ... 1 year

- Datasaver 400 Watt (power backup unit) ... call

### Curtis ... lifetime

### ACCESSORIES

- Printer Stand ... 18.
- Universal System Stand ... 25.
- CABLES**
- Smartmodem-to-PC Cable (9 feet) ... 17.
- Keyboard Extension Cable (3 to 9 feet) ... 27.
- Extension Cables for IBM Mono Display ... 33.
- Printer-to-IBM cable (9 feet) ... 17.
- SURGE SUPPRESSORS**
- Salestrip (5 outlets) ... 21.
- Diamond (6 outlets) ... 29.
- Diamond-Plus (w/FAX & modem protection) ... 41.
- Emerald (6 outlets; 6 ft cord) ... 46.
- Sapphire (3 outlets; EMU/RFI filtered) ... 37.
- Ruby (6 outlets; EMU/RFI filtered, 6 ft cord) ... 55.
- Ruby-Plus (w/FAX & modem protection) ... 65.
- Command Center ... SPECIAL ... 79.

### DCA ... 1 year

- Irma (3270 emulation board) ... 729.

### Epson ... 1 year

- EX-800 printer (80 col., 300 cps) ... 499.
- EX-1000 printer (136 col., 300 cps) ... 569.
- FX-85 printer (80 col., 180 cps) ... 379.
- LX-86 printer (80 col., 120 cps) ... 245.
- LO-800 printer (80 col., 180 cps) ... 549.
- LO-1000 printer (136 col., 180 cps) ... special
- LO-2500 printer (136 col., 324 cps) ... 1089.
- Printer-to-IBM cable (6 feet) ... 15.

For the IBM-PC (XT & AT) Exclusively.

# PC CONNECTION®



# 800/243-8088.

<b>Everex ... 1 year</b>	
Evercom II 1200 Baud Internal modem	\$137.
<b>5th Generation ... 6 months</b>	
Logical Connection Print Buffer 256k	call
<b>Hayes ... 2 years</b>	
Smartmodem 1200	389.
Smartmodem 1200B (w/Smartcom II)	349.
Smartmodem 1200B (no software)	319.
Smartmodem 2400	589.
Smartmodem 2400B (w/Smartcom II)	529.
Smartcom II 2.1 (software)	89.
<b>Hercules ... 2 years</b>	
Hercules Color Card	159.
Hercules Graphics Card	189.
Hercules Graphics Card Plus	call
<b>Intel ... 5 years</b>	
Above Board PC 64k (upgrades to 2 Meg)	call
Above Board AT 128k (upgrades to 2 Meg)	call
Above Board PS-AT 64k C/S/P	call
Above Board PS-AT 128k S/P	call
8087 (for IBM-PC & XT)	119.
8087-2 (for 8 MHz PC compatibles)	169.
80287 (for IBM-PC AT & XT 286)	195.
80287-8 (for 8 MHz AT compatibles)	269.
<b>Kensington Microware ... 1 year</b>	
Masterpiece	94.
<b>key tronic ... 90 days</b>	
5151 keyboard (deluxe)	169.
<b>Kraft ... 1 year</b>	
Joystick (2 button)	27.
Joystick Adapter Card	29.
New! 3 Button Joystick	33.
<b>Microsoft ... 1 year</b>	
Microsoft Bus Mouse with software 6.0	127.
Microsoft Serial Mouse with software 6.0	135.
<b>Mouse Systems ... lifetime</b>	
PC Mouse with PC Paint+	127.
Bus Mouse with PC Paint+	127.
<b>NEC ... 2 years</b>	
Multisync monitor (EGA compatible)	call
<b>NSI Logic ... 3 years</b>	
Smart EGA	299.
<b>Orchid Technologies ... 1 to 2 years</b>	
Tiny Turbo 286	445.
PC Turbo 286 w/1 Meg	739.
Turbo EGA	589.
<b>Princeton Graphics ... 1 year</b>	
MAX-12E Amber monochrome monitor	179.
HX-12 RGB monitor (690 x 240)	449.
<b>Quadram ... 1 to 2 years</b>	
Expanded Quadboard C/S/P	
0k (upgrades to 384k)	129.
384k (fully populated)	179.
Microfazer printer buffer 64k (parallel)	159.
Microfazer II printer buffer 64k	249.
QuadEGA+ (half card)	349.
<b>SMA ... 30-day money-back guarantee</b>	
PC Document Keyboard Templates:	
DOTS/Basic 3.0-3.1	WordStar
Lotus 1-2-3	WordStar 2000
Symphony	Multimate
dBase III	WordPerfect
	each 12.

<b>Toshiba ... 1 year</b>	
P351 S/P printer (80 col., 216 cps)	\$519.
P351 S/P printer Mod 2 (136 col., 288 cps)	1049.
Toshiba T1100 PLUS Laptop Computer	call
Toshiba T3100 Laptop Computer	call
<b>Tsang Labs ... 1 year</b>	
EVA 480 (supports 640x480 resolution, includes drivers for Lotus 1-2-3 ver. 1A)	399.
<b>Video 7 ... 2 years</b>	
VEGA (half card)	329.
VEGA Deluxe (w/FREE Microsoft Windows)	399.

<b>DS/High Density Disks for the AT (96 TPI)</b>	
Fuj (10 disks per box)	\$27.
Verbatim (10 disks per box)	29.
Maxell (10 disks per box)	34.
<b>3 1/2" Double-sided Diskettes (720k)</b>	
Verbatim (10 diskettes)	26.
Sony (10 diskettes)	26.
MAXELL (10 diskettes)	26.
3M (10 diskettes)	27.
BASF (5 diskettes)	14.

## DRIVES

<b>I2 Interface ... 1 year</b>	
20 Meg Hard Drive Card (85 ms)	459.
<b>IOmega ... 90 days</b>	
Bernoulli Box 20 Meg w/PC2 card	call
10 Meg cartridge	57.
Bernoulli Box 40 Meg w/PC2 card	call
PC2B (Bootable) Card	229.
20 Meg cartridge	79.
<b>Mountain Computer ... 1 year</b>	
Drive Card 20 Meg (80 ms)	call
<b>Seagate ... 1 year</b>	
20 Meg Internal Hard Drive (w/controller and cables, 65 ms)	389.
20 Meg Internal Hard Drive (w/Western Digital controller and cables, 65 ms)	409.
20 Meg Internal Hard Drive for AT (40 ms)	569.
<b>Tandon ... 1 year</b>	
New Business Card 20 Meg (85 ms)	409.
<b>TEAC ... 1 year</b>	
PC, XT 360k Drive (5 1/4" half-height)	109.
<b>Toshiba ... 1 year</b>	
PC, XT 360k Drive (5 1/4" half-height)	109.
AT 360k Drive (5 1/4" half-height)	117.
<b>Western Digital ... 1 year</b>	
File Card 20 Meg (w/XTREE, 80 ms)	call

## MEMORY

<b>64k Memory Upgrade Set for IBM-PC or XT system board or any memory board</b>	
150 nanosecond (set of 9)	15.
<b>256k Memory Upgrade Set for any IBM-AT memory board (9 chips)</b>	39.

## DISKS

<b>All disks have a lifetime warranty.</b>	
<b>DS/DD Disks for the PC &amp; XT (40 TPI)</b>	
Verbatim Datafile (10 disks per box)	15.
Maxell MD-2 (10 disks per box)	19.

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## MISCELLANEOUS

<b>Automation Facilities</b>	
Floppicide Disk Drive Cleaner	18.
<b>Compuserve Information Service</b>	
(includes subscription, manual, \$25 usage credit, monthly publications)	24.
<b>Dow Jones Membership Kit</b>	24.
<b>Environmental Software</b>	
Nylon Computer Covers PC, XT or AT	20.
<b>Innovative Concepts</b>	
Flip n' File 50 (holds 50 disks)	16.
Flip Sort (holds 70 disks)	15.
<b>PC Connection</b>	
Computer Toolkit (all the tools you need to go with your PC in a software style binder)	29.

## OUR POLICY

- We accept VISA and MASTERCARD
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a period order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All U.S. shipments insured, no additional charge.
- APO/FPO orders usually shipped 1st Class Mail.
- Allow 1 week for personal and company checks to clear.
- UPS Next Day Air available.
- COD max. \$1000. Cash or certified check.
- 120 day limited warranty on all products.
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-3383 Monday through Friday 9:00 to 5:30.

## SHIPPING

- Note:** Accounts on net terms pay actual shipping.
- Continental US:**
- For monitors, printers, and drives, add 2% for UPS ground. Call for UPS 2nd-Day & Next-Day-Air.
  - For computers, pay actual charges. Call for UPS 2nd-Day & Next-Day-Air.
  - For all other items, add \$2 per order to cover UPS Shipping. For such items, we automatically use UPS 2nd-Day-Air at no extra charge if you are more than 2 days from us by UPS ground.
- Hawaii:**
- For monitors, printers, and drives, add UPS Blue charge will be added. For all other items, add \$2 per order.
- Alaska and outside Continental US:**
- Call 603/446-3383 for information.

For the IBM-PC (XT & AT) Exclusively.

# PC CONNECTION®

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CIRCLE 339 ON READER SERVICE CARD



# PC Pastimes.

## The play's the thing.

For years, industry fuddle duddies have been trying to figure out the extraordinary attraction of our industrious fuzzy wuzzies. How, they ask themselves, did a bunch of small tree-climbing carnivorous mammals manage to metamorphose the miniature maildrop of Marlow, NH (pop. 545) into a micro mail-order monolith?

Well, our masked mascots aren't too concerned with the secret of their success—they're too busy enjoying themselves. And so are we. Because helping you put together perfect PC systems (at superlative prices) is our idea of a good time.

## Everybody wins.

We know it's no fun struggling late into the night with an obsolete program when you could be snuggling up to your favorite furry friend. Or tearing your hair out over some incomprehensible instal-

lation when you could be enjoying some innocent interlude. That's why we sell only the latest versions of products at the lowest prices, and make sure that you have everything you need to get up and running. We even have a special tech support number (1-800-PCC-TECH) staffed by perpetually positive-thinking pros who can make any set-up a pleasure.

## Get on the (joy) stick!



Give your PC the bird—with Hopper. Together at last with PC Man, on one disk. Offer not available to net accounts. Limit one per customer.

We know there's nothing like taking a break from the Great American Novel or Ultimate Spreadsheet to indulge in a little light electronic amusement. So we're offering a free copy of our very own *PC Man and Hopper* to anyone who places a \$500 order between now and March 31.

Just call 1-800/243-8088 or 1-603/446-3383, M-F 9:00 to 9:00; Saturday to 5:30. If you're planning to visit, call ahead to make sure what you want is in stock.

For the IBM-PC (XT & AT) exclusively.

# PC CONNECTION

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## NOMINEES

Compaq Portable II/Compaq Computer Corp.

IBM PC Convertible/  
IBM Corp.

Gridcase 3/  
Grid Systems Corp.

Keystyle 80/Quadram Corp.

Toshiba T3100/  
Toshiba America Inc.

Toshiba T1100 Plus/  
Toshiba America Inc.

Zenith Z-181 Portable PC/  
Zenith Data Systems

## FINALISTS

Gridcase 3/  
Grid Systems Corp.  
Larry Gravelle  
Karl Nakamura  
Dennis Mitchell

Toshiba T3100/  
Toshiba America Inc.  
Tetsuya Mizoguchi  
Haruhiko Banno  
Yasuo Suzuki

Toshiba T1100 Plus/  
Toshiba America Inc.  
Tetsuya Mizoguchi  
Ginzo Yamazaki  
Nobuyuki Tanaka

Zenith Z-181 Portable PC/  
Zenith Data Systems  
Robert Dilworth

# PORTABLE COMPUTERS

Tetsuya Mizoguchi Haruhiko Banno Yasuo Suzuki

**TOSHIBA T3100**  
Toshiba America Inc.

**T**echnical excellence comes in many forms, not the least of which is packaging. Toshiba's T3100 is a perfect example: It takes existing parts and technologies and assembles them in an amazingly compact machine that rivals the IBM PC AT in performance. It uses surface-mount

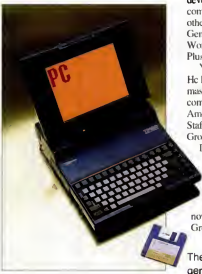
technology to maximum advantage, and the power supply is a jewel of miniaturization. With its 80286, 10-megabyte hard disk, 3½-inch floppy disk drive, and crisp plasma display, the T3100 has become a favorite of consultants.

Tetsuya Mizoguchi joined Toshiba in 1963. He has been involved in the development of medium- and large-scale computers, Japanese word processors, and other data processing equipment. He is General Manager of Engineering, Ome Works, where the Toshiba T1100, T1100 Plus, and T3100 were developed.

Yasuo Suzuki joined Toshiba in 1972. He has been involved in the development of mass storage peripherals and small business computers. He was assigned to Toshiba America from 1981 to 1983. He is now Staff Engineer in the Personal Computer Group, Office Automation Equipment Department, Ome Works, which developed the T3100.

Haruhiko Banno joined Toshiba in 1968. He has been involved in the development of medium- and large-scale and personal computers. He is now Manager of the Personal Computer Group, Ome Works.

The Toshiba T3100 is the first in a generation of AT-class portables.



# PORTABLE COMPUTERS

Robert Dilworth

## ZENITH Z-181 PORTABLE PC

Zenith Data Systems

**Z**enith's Z-181 Portable PC would be just another well-designed portable—if it weren't for the display. But the display is truly exceptional. And that exceptional display truly advances the state of the art in laptop computing. The contrast on the Z-181's screen is easily equivalent to that of a printed page or a monitor. It's hard to imagine a more versatile display: it retains its readability in anything from a pitch-dark room to bright sunlight.

Zenith Data Systems' new Z-181 Portable PC was designed through team effort from the company's engineering, marketing, and product design divisions. ZDS President Robert Dilworth represents the team that designed the Z-181. Before joining ZDS in 1985, Mr. Dilworth was president and chief executive officer of Morrow Designs for 3 years.

The Zenith Z-181 Portable PC's supertwist backlit LCD sets an incredibly rich and crisp standard for laptop screen readability.



## NOMINEES

V-EMM/Fort's Software

*What's Best*/  
General Optimization Inc.

HAL/Lotus  
Development Corp.

Referee/Personsoft, Inc.

SmartNotes/Personics Corp.

SQZ!/Turner Hall Publishing

*SafetyNet*/  
Westlake Data Corp.

## FINALISTS

*What's Best*/General  
Optimization Inc.  
Sam L. Savage  
William J. Arendt  
Linus Schrage  
Kevin Cunningham

HAL/Lotus  
Development Corp.  
Bill Gross

SmartNotes/Personics Corp.  
Dr. Merrick Furst

# SOFTWARE ADD-ONS

Sam L. Savage William J. Arendt  
Linus Schrage Kevin Cunningham

**WHAT'S BEST**  
General Optimization Inc.



Linear programming is *What's Best's* strength.

Lotus's 1-2-3 has millions of users and has created an enormous aftermarket for add-on software. General Optimization's *What's Best* does the nearly impossible: it makes the concepts of linear programming accessible from within 1-2-3 spreadsheets. And it does so without burdening the user with theories and thick textbooks. Linear programming is a sophisticated, arcane practice that helps optimize problems with multiple solutions. Its theories and formulas are known by few and understood by fewer still, but it works. *What's Best* is an ideal combination of business-school practice and heads-up programming. *What's Best* truly advances the state of the art in business applications of spreadsheets.

Sam L. Savage is President of General Optimization. He was responsible for the overall design of *What's Best* as well as for the program's user interface and documentation. Savage has a Ph.D. in computer science from Yale. He has taught applied math at the University of Chicago

Graduate School of Business since 1974. He is also famous for developing and marketing the "Schmuzzle Puzzle" (made up of identically shaped pieces!).

William J. Arendt is a Systems Consultant at General Optimization and was responsible for the DOS interface and integration of *What's Best*. He holds both an undergraduate degree in engineering and a J.D. from the University of Illinois. Before joining General Optimization, Arendt worked at SPSS (Statistical Packages for Social Services) where he served on a committee designing future products.

Linus Schrage is Chairman of the Scientific Advisory Board at General Optimization. He is also the founder and director of Lindo Systems. Schrage shared responsibility for designing the code for *What's Best*. Schrage taught mathematical optimization at the University of Chicago Graduate School of Business in 1967. He has a Ph.D. in operations research from Cornell University.

Kevin Cunningham has worked closely with Linus Schrage and Lindo. Cunningham collaborated on the code design for *What's Best*. He is a Vice President for Development with Lindo Systems and specializes in mathematical optimization. Cunningham has an M.B.A. from the University of Chicago.

TRUCK LOADING					
Item	Load Value	Load Weight	Proportion Loaded	Maximum Proportion Loaded	Proportion For Loaded
1	\$22,500	7,500	0.00	1	1
2	\$26,000	7,500	0.00	1	1
3	\$2,000	3,000	0.00	1	1
4	\$9,500			1	1
5	\$11,500			1	1
6	\$9,750			1	1
Total Value of Load					\$3,000

*What's Best* adds to 1-2-3's capabilities.

# SOFTWARE

## ADD-ONS

Bill Gross

**HAL**

Lotus Development Corp.

When *HAL*'s creators brought it to *PC Magazine*'s offices, we were impressed—we didn't think it was possible for anyone to interface so closely with a program's inner workings without access to the source code. Evidently the people at Lotus had the same impression: the next day they bought the company. *HAL* gives users with the most rudimentary knowledge of spreadsheet principles full access to *1-2-3*'s underlying power. It goes further to add features that weren't built into the underlying product. *HAL* has a strong sense of what you want to do next and a simple statement, such as "Graph this," usually produces the desired results. A natural-language interface to the world's most popular program is incredibly significant. Few existing users will want to be without it, and it will bring *1-2-3* to a whole generation of new users.

Bill Gross, 28, is a Software Consultant for Lotus Development Corp. Prior to joining Lotus, Gross was the founder and president of GNP Development Corp. of Pasadena, California. GNP was the initial developer of *HAL* and was acquired by Lotus in February 1986. GNP produced enhancement software for Lotus products. These products include *CPA+*, an accounting program for *1-2-3*, *Reveal+*, a

*HAL*'s natural-language commands make it a valuable partner to *1-2-3*.



*HAL* unleashes *1-2-3*'s power for the experienced and novice user.

speedup for *1-2-3* and *Symphony* that utilizes the Intel 8087 math coprocessor, and *Password+*, a program that allows users to password-protect worksheet files. Gross received a B.S. in engineering and applied science from the California Institute of Technology. [In accepting the award for *HAL*, Bill Gross represents the entire joint development team which included Larry Gross, Steve Klein, and Dave Rulfe.—Ed.]

	January	February	March	April	May	June
Atlanta	\$12,500	\$12,750	\$13,000	\$13,250	\$13,500	\$13,750
Miami	\$12,000	\$12,200	\$12,400	\$12,600	\$12,800	\$13,000
New York	\$10,500	\$10,600	\$10,700	\$10,800	\$10,900	\$11,000
	\$22,500	\$22,600	\$22,700	\$22,800	\$22,900	\$23,000

The cell relations to the range B3..B6 are:

- Cell B3 = Cell B2 + 1.50
- Cell B4 = Cell B3 + 1.50
- Cell B5 = Cell B4 + 1.50
- Cell B6 = Cell B5 + 1.50
- Cell B7 = Cell B6 + 1.50
- Cell B8 = Cell B7 + 1.50

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COMPAQ announces its biggest improvement yet to the industry standard—the new COMPAQ DESKPRO 386™. It reaches far higher levels of speed, compatibility, performance and expandability than have ever been possible in personal computers. At the heart of this breakthrough is the new high-speed, 32-bit, 16-MHz Intel® 80386 microprocessor

## Introducing the new COMPAQ DESKPRO



## The most advanced personal

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# advanced-technology computers

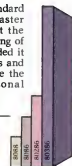
that runs industry-standard software 2-3 times faster than ever before. But the chip is just the beginning of this story. We surrounded it with dozens of features and enhancements to create the most advanced personal computer in the world.

## Each component the very best

Every component has been optimized to take advantage of the increased speed and power of

the 80386. We offer, for instance, more storage, up to 130 Megabytes, with access times 50 to 150 percent faster than most computers. Plus you get the flexibility of up to four storage devices. But that's just the beginning.

We give you more memory. Enhanced color graphics. Even a built-in expanded memory manager that breaks the 640K barrier of current operating systems. We improved the keyboard, quadrupled the capacity of the internal fixed disk drive backup to 40 Megabytes and made it twice as fast as before,



The Intel 80386 microprocessor is faster and more powerful than its predecessors.

then went on to add a host of other features. Combined, they make this the first PC to offer a true minicomputer level of performance in a versatile, industry-standard desktop computer.

## The winning numbers

The new COMPAQ DESKPRO 386 features advanced 32-bit architecture that processes twice as much information as 16-bit computers in the same amount of time. Coupled with its impressive 16-MHz processing speed, it radically improves the responsiveness of spreadsheets, databases and networks as well as the ease of multi-tasking.

It runs thousands of business programs as well as all the popular engineering software, achieving an unparalleled level of performance, and making it a replacement for expensive dedicated engineering and scientific workstations.

And because it's so compatible, there's no other personal computer more connectable. As a result, you can use industry-standard expansion

boards to network, communicate with mainframes and minicomputers, or even support several terminals.

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The COMPAQ DESKPRO 386 combines superior technology with COMPAQ innovation to let you do things once thought impossible or impractical with PCs. There may be companies that copy one or two of its features, but it will be years before they can copy them all. It's clearly the computer of choice for today's and tomorrow's most demanding users. From the company with the highest user satisfaction ratings in the industry. For the Authorized Dealer nearest you, or to obtain a brochure, call 1-800-231-0900 and ask for Operator 27. In Canada, call 416-449-8741, Operator 27.



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**COMPAQ**  
**DESKPRO 386™**



## COMPILERS

Turbo PROLOG/  
Borland International Inc.

LISP/Gold Hill Computers

QuickBASIC 2/Microsoft Corp.

C Compiler 4.0/Microsoft Corp.

## EDITORS

Turbo PROLOG/  
Borland International Inc.  
Philippe Kahn  
Leo Jensen  
Jon Hofman

QuickBASIC 2/Microsoft Corp.  
Steve Rowe

C Compiler 4.0/Microsoft Corp.  
David Norris

# PROGRAMMING LANGUAGES

Steve Rowe  
**QUICKBASIC 2**  
Microsoft Corp.

Microsoft's first BASIC compiler put a lot of people into the programming business. BASIC's ease of learning, accessibility, and hardware compatibility have made it a popular and effective solution to custom-programming problems. But both the hardware and the BASICA interpreter moved far ahead of the BASIC compiler.

But BASIC is back, and it's better than ever. QuickBASIC 2 is an editor, a compiler containing a slate of extra powerful new commands, and a superior debugging environment—all at a very accessible price. It's hard to imagine a faster or more productive programming tool for most users



Price and performance make QuickBASIC 2 a prime pick.

than Microsoft's QuickBASIC. Steve Rowe joined Microsoft in November 1980. At various times he has worked on 28000 BASIC, 68000 BASIC for the Tandy Xenix system, COBOL 2.0, as well as QuickBASIC 1.0 and 2.0. Before joining Microsoft, Rowe worked for Boeing on a NASA contract designing a database management system called IPAD and also worked for Control Data Corp. as a programmer. Rowe spent 3 years in the Air Force fixing long-range radar systems. He has a B.S. degree in mathematics from the University of California at Davis.



QuickBASIC 2 is a fast, full-featured programming tool: an editor, compiler, and debugger.

# APPLICATION SOFTWARE

Phil Quackenbush Ron Benn  
Paul Salsbury

## NEW VIEWS

Q.W. Page Associates Inc.



Nothing is as boring as accounting software—unless it's done right. And *NewViews* is a totally fresh approach to accounting. Its authors took the best from the fertile field of personal computing and adopted features from word processors, spreadsheets, and database programs to create a thoroughly modern approach to the traditional problems of accounting. *NewViews* looks at business accounting as a hierarchical database, then allows the user to window into different parts of it with varying levels of detail. It offers five different user interfaces, emulating such popular programs as *1-2-3* and *WordStar*.

Phil Quackenbush is President and Founder of Q.W. Page Associates. He recognized at a very early stage that existing accounting systems were inadequate and complex. Mr. Quackenbush's experience in the computer industry and his appreciation for the sensibilities of accountants and businessmen were significant factors leading to the design and success of *NewViews*. Quackenbush graduated from the University of Toronto with a B.S. in computer science and commerce. Upon graduation, he joined Andreas Wrede as a consultant to small businesses in the areas of systems and accounting software.

Ron Benn is Marketing Manager of Q.W. Page. Benn worked in sales for NCR,

in systems designs for IBM, and in customer support services for the small systems department of the University of Toronto Computer Services. Prior to joining Q.W. in 1981, he was an independent systems consultant. Benn holds an M.B.A., and an M.S. in computer science from the University of Toronto.

Paul Salsbury is Manager of Product Development at Q.W. Page and has experience in the design and implementation of a wide variety of systems software. Salsbury has an M.S. in electrical engineering, and a law degree from the University of Toronto. Following graduation, Salsbury practiced law for 3 years, before joining Q.W. Page in 1983.

Q.W. Page Associates Inc.			
Financial Statement			
Period: Jan 000 00.00 to Dec 31.00			
REVENUE		600,520.00	
Less Return		5,000.00	
<b>Net Sales</b>			<b>595,520.00</b>
COST OF GOODS		411,700.00	
Purchases		5,000.00	
Less Return			
<b>Net Purchases</b>			<b>406,700.00</b>
Change in Inventory for period		50,750.00	
<b>Cost of Goods Sold</b>			<b>355,950.00</b>
<b>Gross Profit</b>			<b>239,570.00</b>
<b>SELLING EXPENSES</b>			
Description	Qty	000 00.00	End: Dec 31.00 Type: A

## NOMINEES

*dBASE III Plus*/Ashton-Tate

*SuperCalc4*/  
Computer Associates

*R:base System V*/Microrim

*NewViews*/Q.W. Page  
Associates Inc.

*First Choice*/Software  
Publishing Corp.

*DataEase*/Software  
Solutions Inc.

*MoneyMate*/Real World Corp.

*ProDesign II*/American Small  
Business Computers

## FINALISTS

*R:base System V*/Microrim  
Wayne J. Erickson  
Fred P. Gray

*NewViews*/Q.W.  
Page Associates Inc.  
Phil Quackenbush  
Ron Benn  
Paul Salsbury

*First Choice*/Software  
Publishing Corp.  
Ed Mitchell  
David Jones

*NewViews* breaks  
new ground in  
accounting.

## ■ TECHNICAL EXCELLENCE

### NOMINEES

VINES/Banyan Systems Inc.

IBM Token-Ring Network/  
IBM Corp.

The Smart LAN Performance  
Test/Innovative Software Inc.

Advanced NetWare/286/  
Novell Inc.

LanCourier TG-8000/  
Tallgrass Technologies Corp.

DataFlex/Data Access Corp.

### FINALISTS

VINES/Banyan Systems Inc.  
Larry Floryan  
James Allichin

IBM Token-Ring Network/  
IBM Corp.  
Frank Whitten

Advanced NetWare/286/  
Novell Inc.  
R. Drew Major  
Kyle E. Powell  
Dale R. Neibaur



NetWare is the new  
connectivity standard.

# NETWORKING

R. Drew Major Kyle E. Powell Dale R. Neibaur

**ADVANCED NETWARE/286**  
Novell Inc.

Novell advances the state of the art in networking software by the use of protected mode. The result is a server that is fast and flexible. *PC Magazine's* LAN benchmark tests prove that *NetWare* sets a standard for performance in the area of disk management. Novell's directory-hashing technique indexes entries according to a mathematical formula for fastest retrieval. Add to this *NetWare's* "elevator-seeking" and disk-caching system features, which further optimize disk server performance. *Advanced NetWare/286* allows users to mix up to four different brands of network cards in one server, with the greatest variety of options—the differences in hardware remaining invisible to the people at their workstations. *NetWare's* system security is still another technical advance. Under Novell, the ability to read, write, create, delete, search, and modify files are all separate functions that can be allowed or denied to individual users. Novell has consistently remained at the forefront of network technology, and *Advanced NetWare/286* is only the latest example.

R. Drew Major has done design and implementation work for local area networks since 1981. A partner in the consulting firm SuperSet Software, Major has been allied with Novell since its earliest days. Among other accomplishments, he had developed networking software for the 68000, 8086, and 80286 microprocessors,

disk-driver software, disk-caching software, and low-level file-system primitives. He has also written network shells, seven operating systems, microprocessor emulations, computer games, and several operating system kernels. Major has been a driving force in the development of *System Fault Tolerant NetWare*. He graduated with high honors in math and computer science from Brigham Young University in Provo, Utah.

Kyle E. Powell is a partner in SuperSet Software and has been consulting for Novell since 1981. At Novell he is one of the key developers of the *NetWare Operating System*. His major contributions are multiuser synchronization, fault tolerance, and DOS compatibility. He designed and built the first network interface card connecting an IBM PC to Novell's 68000-based server. He has a degree in computer science from Brigham Young University.

Dale R. Neibaur has been a consultant to Novell since January 1983 and was a consultant to the parent company, NDSI (Novell Data Systems Inc.) from October 1981 until January 1983. At Novell he is one of the key developers of the *NetWare Operating System*. Neibaur was a consultant to Savin Corp. and to Qume Corp. He also was a programmer/analyst for Terminal Specialties from November 1979 until April 1980. He graduated from Brigham Young University in 1979 with a B.S. in computer science.

# PERSPECTIVE PERSPECTIVE



Three D Graphics wants to thank PC Magazine for this honor, and all the other publications who have acclaimed PERSPECTIVE as a new standard in graphics software.

"PERSPECTIVE... is the best thing I've seen yet for graphically displaying complex information... I almost feel guilty about PERSPECTIVE because it's allowed me to be so productive with almost no effort. That's progress."

*PC Magazine*

"Industry Standard Emerges in Presentation-Graphics Field"

"PERSPECTIVE... is probably the most exciting business and presentation-graphics package ever to muscle its way into the PC market... PERSPECTIVE'S user interface, drawing speed, versatility and sheer practicality could easily place it in the software hits category along with packages such as 1-2-3, Turbo Pascal, and Executive Systems' Xtree... PERSPECTIVE is, simply stated, an amazing and sensational package."

"... on all counts, PERSPECTIVE is probably the most sophisticated presentation graphics package yet released, in any form, for any PC, on any operating system."

*PC Week*

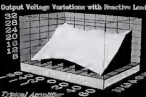
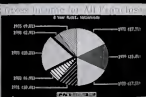
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"... none of the competitors can present charts with the same visual variety and impact. PERSPECTIVE is a dramatic, even dazzling product. Nothing we've seen is as quick or as easy to use."

*Infoworld*

"... Three D Graphics has brought to business graphics a quality that's been sorely lacking — true perspective... Combine great graphics with a smooth, intuitive package, and you've got the best business graphics program currently available."

*Microtimes*



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# ENVIRONMENT

Bob Matthews

## WINDOWS, VERSION 1.03

Microsoft Corp.

When Microsoft's *Windows* was finally released last year, it seemed to be too little too late. But it has proved to be a rich environment for a new generation of graphically oriented programs. More important are the enhancements that keep *Windows* progressing toward the ideal applications interface. Dynamic Data Exchange gives applications programs simple, effective intertask communications. The new Postscript driver is a connection to the future. It guarantees the new generation of desktop publishing programs a home on the personal computer.

Bob Matthews joined Microsoft in 1981. In addition to working as *Windows* Development Manager from November 1985 to the present, Matthews has worked on other projects, including *PC Multiplan* and *MacFile*, and served as the project leader on *PC File* and *Windows Write*. Matthews is a 1981 graduate of the University of Washington.

One of the outstanding improvements to *Windows* 1.03 is its Dynamic Data Exchange feature.



*Windows*' device independence makes it an efficient environment for graphics applications.



## NOMINEES

*Windows*, Version 1.03/  
Microsoft Corp.

*DESQview* 386/  
Quarterdeck Office Systems

SCO Xenix System V/  
Santa Cruz Operation Inc.

*Software Carousel*/  
SoftLogic Solutions Inc.

## FINALISTS

*Windows*, Version 1.03/  
Microsoft Corp.  
Bob Matthews

*DESQview* 386/  
Quarterdeck Office Systems  
Gary Pope

SCO Xenix System V/  
Santa Cruz Operation Inc.  
Doug Michels

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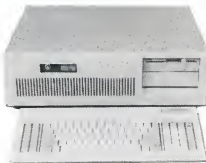


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- Phoenix BIOS
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- 256K RAM
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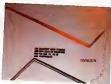
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# Competing at the Top: HIGH- PERFORMANCE ATs

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These are the machines that probably worry IBM's crackerjack marketing department the most. When the men in blue wheel and deal, they can dismiss mail-order compatibles easily enough. But this foursome of well-bred machines, which consists of the Tandon PCA, the Sperry PC/microT, the NEC APC IV, and the Core ATomizer, means serious competition.

Each one of these machines bears a lengthy corporate pedigree. Two trace their lineage to IBM's biggest rivals, Japanese electronics conglomerate NEC and the merged Burroughs-Sperry computer behemoth. The other pair hail from respected mass-storage manufacturers with lengthy, proven track records and reputations for top quality.

The FUD factor—fear, uncertainty, and doubt about marginal suppliers, which IBM plays up to win orders over its questionable competition—does not apply here. All vendors in this foursome display

a common strategy for winning a share of the business computer market. Each one hugs close to the IBM standard in quality, features, and price, adding a few extras and shaving the price tag just a few percentage points to earn an edge.

These are not bargain basement ATs, nor do they have a hint of guilt-edging. All are straightforward, hard-working computers about as close as you can get to the AT standard without raiding the IBM engineering staff or hiring G. Gordon Liddy and company to snoop around Armonk.

As AT compatibles, they share several common characteristics. The minimum-performance standard among them is

that of the 8-MHz IBM PC AT. Although two of them (the Core ATomizer and the Sperry PC/microT) push a trifle higher (about 20 percent) by eliminating microprocessor wait states, the advantage is hardly a quantum leap. In addition, all four machines aim for optimum compatibility

*These four AT  
compatibles all hail  
from companies with  
reputations for quality  
and promise power at  
least on a par with a  
fast AT and extra  
features.*



## ■ AT COMPATIBLES

by offering a reduced-speed mode of 6 MHz with one wait state, the same as the original AT. They all achieve AT compatibility, are all based on Intel's 80286 microprocessor, and all provide space for an 80287 numeric coprocessor. All start with a minimum of 512K bytes of system board memory, although each offers its own options for getting into the territory beyond that.

As with the AT, all require DOS 3.0 or later for proper operation. Unlike IBM personal computers, however, none of them have BASIC built into their ROMs. But all will run disk-based Microsoft BASIC (or any other PC-compatible computer language).

As with the IBM PC AT, all in this foursome have a small block of low-power CMOS (complementary metal oxide semiconductor) memory to store system configuration information, such as the number and type of floppy and hard disks. All use a battery of some kind to keep their memories alive and to power a time-of-day clock even when the system is switched off.

**OPTIONAL FEATURES** Except for the mandatory inclusion of a keyboard, all other features are at the option of the manufacturer. All of the four require a display system of some type (and all are compatible with all popular IBM-style display systems, from straight monochrome to EGA color). Two machines (the Core ATomizer and NEC APC IV) deliver a pair of built-in serial ports and a parallel port. The Sperry makes even a single floppy disk drive an option.

The unifying factor is that these are all "safe" computers. All of them are backed by companies that you've heard of before, companies that predate the first IBM Personal Computer of 5 years ago. You're reasonably assured that these suppliers will still be around tomorrow (as sure as you can be of anything in today's tumultuous world of business). These are computers that you should be able to depend on.

### NEC APC IV

The NEC APC IV is the machine that ought to have IBM the most worried. The Japanese industrial giant that manufactures it—NEC Information Systems—is one of



*The NEC APC IV may not look like the IBM PC AT on the outside, but the case covers a chassis that is almost identical to the AT's. One notable feature: the front panel can give access to four half-height devices. Inside the machine there are five 16-bit expansion slots and two 8-bit slots available. The eighth slot is occupied by the controller card. The optional 40-megabyte hard disk performs like IBM's hard disk; both have access times pegged at just under 40 milliseconds.*



the few companies worldwide with the might, stamina, and resources to give Big Blue a good fight.

The APC IV is an unabashed clone. Its advances over the original AT are mini-

mal. The chief differences are speed (the APC IV runs with either the old-AT-6- or new-AT-8-MHz system clock, both with one wait state) and communications (the APC IV features two built-in serial ports

## ■ AT COMPATIBLES



### FACT FILE

#### NEC APC IV

NEC Information Systems Inc.  
1414 Massachusetts Ave.  
Boxborough, MA 01719  
(617) 264-8000

**List Price:** With 640K RAM, 1.2-Mbyte floppy disk drive, two serial and one parallel port, \$2,995.

**Options:** With 20-Mbyte hard disk, \$3,495; with 40-Mbyte hard disk, \$3,995; NEC Multisync monitor and advanced graphics board, \$1,425

**Microprocessor:** 80286

**Clock Speed:** 6 and 8 MHz

**Expansion Slots:** Eight

**In Short:** The NEC APC IV is as identical to the IBM PC AT as any compatible is going to get. Big Blue should keep an eye on NEC.

CIRCLE 700 ON READER SERVICE CARD

and one parallel port). Each port can be individually defeated by a DIP-switch array on the system board. The serial ports use AT-style male DB-9 connectors. The computer offers a standard memory of 640K bytes, all on the system board. Seven expansion slots are available, two using the XT-style 8-bit data bus, five with the AT-style 16-bit bus. One more 16-bit slot is used by a combined floppy and hard disk controller.

As should be expected, the performance of the APC IV virtually duplicates that of the IBM PC AT running at the same speed. Even the speed of the optional half-height NEC 40-megabyte hard disk (a NEC 20-megabyte disk is also available) agrees with IBM's disks, with an average access time of just under 40 milliseconds. The hard disk controller is virtually identical to IBM's choice, made by Western Digital Corp. The standard single floppy disk drive is a 1.2-megabyte high-density unit.

The styling of the APC IV's case varies from the AT standard, but it covers a chassis laid out identically to the IBM product. The APC IV, however, gives sufficient front panel access for four half-height devices by opening both of the side-by-side drive slots. The top lifts off instead of sliding forward.

The key switch of the APC IV has three positions: lock, unlock, and reset. The

change-speed switch is located under a front panel lip.

**GREAT KEYBOARD** Clock speed cannot be changed while the APC IV is operating. Flip the switch and the computer turns utterly comatose. The NEC keyboard is the most IBM-like of any non-IBM computer I've ever laid my hands on. As does the IBM keyboard, it offers a positive over-center feel and a mechanical key-click reminiscent of actual typing, a bit quieter and somewhat higher pitched than the IBM.

The principal differences between the two machines are styling (the APC IV looks squarer and more modern than the IBM) and weight (the APC IV both is physically lighter and seems to require a slightly lighter touch than the IBM). The keyboard layout matches that of the 84-key original AT with a large Enter key, left-hand function keys, and LED indicators over the numeric/cursor keypad.

Standard equipment does not include a display system, although the system we evaluated was equipped with an extremely good NEC EGA and Multisync monitor.

With the APC IV what you get is essentially an IBM PC AT made by someone else. The APC IV is the sincerest form of flattery—and competition.

## Sperry PC/microIT

The Sperry PC/microIT is a work of electronic artistry, the first computer to compress AT power into a case smaller than an ordinary PC, little more than the width of two disk drives (14 inches) and one full drive high (5 inches). In fact, the PC/microIT rates better than an IBM PC AT, holding the promise of being faster than IBM's best machine when running at the fastest of its four speeds, 8 MHz with no wait states. Sperry Corp.'s system also operates at 6 or 8 MHz with one wait state or at 7.16 MHz with none. Operating speed is DIP-switch selected. Unfortunately, the PC/microIT's optional and sluggish hard disk holds it back from fulfilling all of its performance potential.

Inside the diminutive, sharply angled plastic-and-metal case of the PC/microIT are five expansion slots, three with the full 16-bit AT bus. To keep the height of the

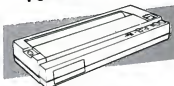
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## ■ AT COMPATIBLES



### FACT FILE

**Sperry PC/microIT**  
Sperry Corp.  
Information Systems Group  
P.O. Box 500  
Blue Bell, PA 19424  
(215) 542-4011

**List Price:** With 512K RAM, one serial and one parallel port, \$2,345.

**Options:** Configured with 1.2-Mbyte floppy disk drive and 20-Mbyte hard disk, \$3,815  
keyboard options, \$150-\$250; medium-resolution monochrome monitor, \$680; EGA monitor, \$849.

**Microprocessor:** 80286

**Clock Speed:** 7, 16 and 8 MHz

**Expansion Slots:** Five (horizontal)

**In Short:** The Sperry PC/microIT is remarkable for its compact size and gets the Editor's Choice nod, even if its hard disk option is too slow.

CIRCLE 600 ON READER SERVICE CARD

system unit low without compromising compatibility with tall AT-size expansion cards, the slots are oriented sideways; boards fit in horizontally from the left.

In the unit tested, one 8-bit slot was filled with a display adapter, and a 16-bit slot housed a Western Digital hard disk controller. The floppy disk controller is part of the system board.

Also soldered onto the system board circuitry are one serial port, one parallel port, and half a megabyte of memory. A special proprietary daughtercard pushes the parity-checked RAM total to 1.5 megabytes (using 120-nanosecond, 256K-bit chips) without sacrificing an expansion slot. One memory expansion board extends memory to Sperry's officially sanctioned maximum of 3.5 megabytes. A design deficiency results in a waste of 384K bytes of RAM when devoting a full 640K to DOS (unless you add a special memory expansion board called the "Mapper").

Because of the tiny size of the PC/microIT, disk drive space is at a premium. There's room for only two half-height devices, floppy or hard disks. Standard equipment includes exactly zero disk drives, ostensibly in order that the machine can serve as a diskless network node. Sperry offers two disk drives for the PC/microIT, a high-density (1.2-mega-

byte) 5¼-inch floppy and a 20-megabyte hard disk.

**SLOW HARD DISK** The Sperry hard disk drive proved to be the weakest part of the PC/microIT evaluation unit. Its rela-

tively slow 86-millisecond average access time virtually erased any advantage that was gained by its fast, no-wait-state micro-processor.

Three different keyboards are available from Sperry, including one that matches



*The Sperry PC/microIT is named Editor's Choice because of its remarkable size. It is barely wider than two disk drives (14 inches) and barely taller than one full-height disk drive (5 inches). It packs AT power in a package smaller than a PC. In order to keep the unit short, the expansion slots are oriented sideways so that boards are inserted horizontally from the left. One slot is taken up by the hard disk controller, but the floppy disk controller is integrated into the motherboard. There is room for only two half-height devices on the front panel of the machine.*



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And if you want full EGA color, take a look at the new TeleCAT-286 EGA. With its

high-resolution 13-inch EGA color monitor, you get a full spectrum of brilliant displays. Its low-glare, high-contrast dark screen makes it easy on the eyes, too. You can even change this screen to green monochrome, with the flick of a switch.

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## ■ AT COMPATIBLES

the original 84-key AT layout and one very similar to the new 101-key IBM enhanced keyboard. The evaluation keyboard (original-AT style) proved workable but lacked the positive feel and key-click of the IBM units.

Sperry supplies monochrome, color, and enhanced color display systems compatible with the appropriate IBM standards. The Sperry EGA system also includes a Hercules-compatible monochrome/graphics mode.

System speed, keyboard type, and default monitor type are all set by two banks of DIP switches, hidden behind a small plastic panel under the system security keylock. These switches can be set without digging inside the system unit with flashlight and probe.

The PC/microIT is a desktop pleasure, and would be even more so if it had a quieter fan in its power supply. It's likely a harbinger of the smaller, faster computers of the future.

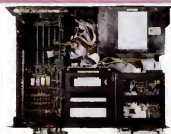
## Core ATomizer

On the surface, the Core ATomizer is the clone-iest of these compatibles. It looks like one of the cut-rate machines you'd buy mail order direct from a magazine ad. But the commonplace appearance of Core International's ATomizer belies its technical refinements.

Beneath the surface, the ATomizer op-



*The Core ATomizer, like the NEC APC IV and the Tandon PCA, sports a chassis that is virtually identical to the AT's. There are eight expansion slots, two 8-bit and six 16-bit. Excellent disk drives (which one would expect to find in a Core machine) and no wait states make the ATomizer a top performer. The display is not included in the base price, as with all the others pictured here.*



erates at either 6 or 8 MHz but with no wait states, giving it a performance advantage of up to 20 percent compared with exact AT duplicates. On the machine we tested, the clock speed can be selected by a small toggle switch on the back panel that appears to have been added as an afterthought. A high degree of compatibility is

assured by a Phoenix ROM BIOS.

As should be expected from the company that has won most of its fame with high-performance disk drives, the Core ATomizer is no slouch when it comes to fast disk access. The (optional) full-height Core ATplus 43-megabyte disk drive installed in the ATomizer showed an average access



## FACT FILE

### Core ATomizer

Core International  
7171 N. Federal Hwy.  
Boca Raton, FL 33431  
(305) 997-6055

**List Price:** With 512K RAM, one parallel and two serial ports, \$1,995.

**Options:** Enhanced model with 1-Mbyte RAM on board, 1.2-Mbyte floppy disk drive, 43-Mbyte hard disk and controller, \$3,895; EGA monitor, \$795; EGA card, \$495.

**Microprocessor:** 80286

**Clock Speed:** 6 and 8 MHz

**Expansion Slots:** Eight

**In Short:** The Core ATomizer was the top performer of this foursome. Its optional hard disk has a very fast access time.

CIRCLE 600 ON READER SERVICE CARD

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## The ME V20

This 8088 based machine with a Norton Rating of 3.3 is the fastest XT compatible on the market. If you need speed, but don't have the budget for the 286 unit, the ME V20 is the ideal, low cost, high performance computer. The ME V20 runs at 4.77/8MHz switchable clock using a NEC V20 processor for maximum speed and still full compatibility. The ME V20 includes: 640K, 360K floppy disk drive, floppy disk controller, and AT style keyboard.

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Santa Ana, California 92705

## ■ AT COMPATIBLES



### Benchmark Tests: AT Compatibles vs. 8-MHz IBM PC AT

Both the Sperry PC/microIT and the Core ATomizer use no-wait-state RAM technology. This makes these machines highly competitive with the 8-MHz IBM PC AT standard; however, the BIOS disk seek times easily distinguish the two. Sperry chose to saddle their PC/microIT with a slow drive, as did IBM with its 6-MHz PC XT Model 286. On the same BIOS Disk Seek benchmark test, the PC-XT 286 clocks in at 95 milliseconds.

The NOP benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in a big 328K-byte loop.

The 8086 instruction mix benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 8086 instruction code. These instructions are a subset of the total processor instruction set.

The Conventional Memory benchmark test allocates 256K bytes of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

The Floating-Point Calculation benchmark test measures processor speed by looping through a series of floating-point calculations, including multiplication, division, exponentials, and logarithmic and trigonometric functions. The benchmark program uses the floating-point library included with Microsoft C Compiler 4.0.

The BIOS Disk Seek benchmark test measures the time it takes to do a random seek using the disk's ROM BIOS. The test result includes minimal software overhead and may not parallel the manufacturer's claimed average access time. The test program performs 1,000 seeks. The average result is shown in milliseconds.

#### Performance Times

(Times given in seconds except where noted)

Product	NOP	8086 Instruction Mix	Conventional Memory	Floating-Point Calculation	BIOS Disk Seek (milliseconds)
8-MHz IBM PC AT	4.2	9.0	1.3	36	37
Core ATomizer*	4.2	7.0	0.9	28	19
Tandon PCA	4.2	8.9	0.9	35	34
Sperry PC/microIT	4.2	7.1	1.3	28	90
NEC APC IV	4.2	8.9	0.9	35	37

\*The Core ATomizer runs at both 6 and 8 MHz; here it was tested at 8 MHz.

time of about 18 milliseconds.

Standard memory is 512K bytes which can be expanded to 1 full megabyte, all on the system board, using parity-checked 256K-bit DRAM (Dynamic Random Access Memory) chips. When installed, the full memory is split into 640K bytes for DOS and 384K in the 80286 extended memory area (for VDISK and friends).

As with the AT, the ATomizer has eight expansion slots, two with the XT-style 8-bit data bus and six using the AT-style 16-bit bus. In the evaluation unit, one of the 16-bit slots was filled with a Core high-performance disk controller (which also operates the floppy disk drive), and a monochrome display adapter occupied an eight-bit slot.

One parallel port and two serial ports are also standard equipment, built into the system board. Notably, the serial ports use XT-style male DB-25 connectors mounted side by side on the back panel of the system unit. Chassis layout exactly matches

■ The Core keyboard rates just below that of the NEC, which makes it one of the best compatible keyboards available.

the AT's, with a reserved internal full-height hard disk slot near the center of the front panel and space on the right for two half-height floppy disk drives (or what have you) with an inaccessible extra half-height slot underneath.

Along with the lock/unlock key switch on the front panel, the ATomizer also includes a square red reset button and LEDs to indicate power on, disk drive access,

and turbo (high-speed) operation. On the unit reviewed, neither the reset switch nor the disk drive activity LED was functional.

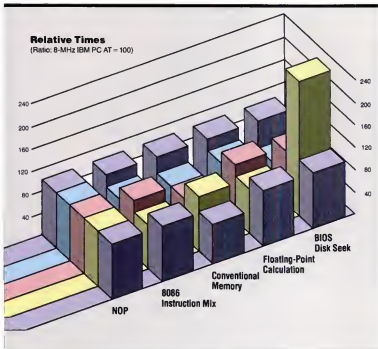
**EXCELLENT KEYBOARD** The Core keyboard rates just a bit below that of the NEC, which makes it one of the best compatible keyboards available. Copying the original AT layout with 84 keys, and enlarged Enter key, left-hand function keys, and LED indicators above the numeric/cursor keypad, it gives an IBM-like feel complete with mechanical key-click and positive touch. It's a pleasure to type on, only seeming a bit "loose" when compared with that of the NEC APC IV.

The combination of responsive disk drive and no microprocessor wait states prevailed, making the ATomizer the top performer among this foursome of compatibles. Never was a delay for disk drive access apparent. In fact, the superb integration of disk drive and system gave it the best "feel" for everyday use.



### Relative Times

(Ratio: 8-MHz IBM PC AT = 100)



## Tandon PCA

The Tandon PCA offers the attractive combination of a respected brand name and a modest price, \$2,195, about a third less than the equivalent IBM product. Although the machine is not a bolt-for-bolt carbon copy of the IBM PC AT and its BIOS bears a Tandon Corporation copyright, the PCA is functionally equivalent to the IBM PC AT and completely hardware and software compatible.

As with most compatibles, the PCA runs at both 6 and 8 MHz with one wait state, per the AT standard. The operating speed is selected by pressing Ctrl, Alt, and Backslash. Front panel controls include a key switch, a power indicator, and a disk activity indicator.

Inside the PCA case, which is nearly identical to an IBM PC AT (it lacks only black paint on the chassis and a plastic bezel on the back panel), is a full-size system board loaded with standard memory of

■ The Tandon PCA offers the attractive combination of a respected brand name and a modest price.

512K bytes in two parity-checked banks of 256K-bit chips, all soldered to the board. On-board memory can be expanded using two banks of sockets. Filling the sockets with 64K-bit chips yields 640K bytes of DOS memory. Two configurations are possible when you pop in 256K-bit chips—I megabyte split into 512K for DOS and 512K expanded memory or 640K for DOS with the balance of RAM



### FACT FILE

#### Tandon PCA

Tandon Corp.  
20450 Plummer St.  
Chatsworth, CA 91311

(800) 556-1234  
(800) 441-2345 (in Calif.)

List Price: With 512K RAM, 1.2-Mbyte floppy disk drive, \$2,195

Options: PCA-20 with 20-Mbyte hard disk, \$2,595; PCA-40 with 40-Mbyte hard disk, \$3,395; parallel/serial interface adapter, \$90; dual video option board, \$90; another monitor, \$190.

Microprocessor: 80286

Clock Speed: 6 and 8 MHz

Expansion Slots: Eight

In Short: The Tandon PCA is the least expensive of the machines reviewed here, but it's also the one with the fewest features.

CIRCLE 89 ON READER SERVICE CARD

unusable. The PCA will support up to 16 megabytes using memory expansion boards.

**EIGHT SLOTS** Eight expansion slots are provided on the system board, six with the AT-style 16-bit bus and two that use the 8-bit XT bus. One 16-bit slot is filled with a combined floppy disk and hard disk controller that uses the Western Digital chip set.

In the machine evaluated, the two 8-bit slots were filled with a Tandon \$90 dual video option board (which drives either a TTL monochrome, RGB color, or composite monitor) and a \$90 parallel/serial interface adapter similar to the one offered on enhanced models of the IBM PC AT. As with the IBM PC AT, the standard PCA system includes no communications options.

Inside the chassis, the PCA layout is identical to that of the IBM PC AT, with one internal full-height hard disk drive slot almost in the middle of the case and three half-height slots on the far right. Unlike IBM's practice, however, the front panel opens to allow access to all three of the half-height slots.

One half-height 1.2-megabyte 5¼-inch floppy disk drive is supplied as standard equipment. An optional (\$1,200) 40-megabyte full-height hard disk was in-



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There is no question we have met our every objective by developing and manufacturing the **BREAKTHRU 286** card. This is the best designed and most functional speed up card available today. We guarantee it.

**HERE IS WHAT MAKES IT SO SPECIAL.**

**First, it installs so easily.** It is a half slot card, only five inches in length. You don't even have to give up a full slot. What's more, unlike competing products it works in the Compaq and most clones. The instructions are so simple we considered showing a picture of a child putting it in. Easy diagrams show how you just place the card in an open slot, remove the original processor and connect a single cable. There is no software required. From that moment you are running faster than an AT.

**Second, it is advanced.** The **BREAKTHRU 286** replaces the CPU of the PC or XT with an 80286 microprocessor that

is faster than the one found in the AT. A 16K cache memory provides zero-wait-access to the most recently used code and data. In benchmark tests the card accelerated software programs—both custom and off-the-shelf anywhere from 200% to as much as 700%. Wow!

**Third, you have full compatibility.** All existing system RAM, hardware, and peripheral cards can be used without software modification. It operates with LAN and mainframe communication products and conforms to the Lotus/Intel/Microsoft Expanded Memory Specification (EMS). Software compatibility is virtually universal.

**Fourth, it is the best there is.** There are several other boards on the market. Some are priced about the same as the **BREAKTHRU 286** and some are cheaper. We at PCSG have compared them all, but there simply was no comparison. What we discovered is that many cards being sold offer only a marginal speed up in spite of their claims. We found some to be merely versions of the obsolete 8088 or 8086, and others to be just poorly engineered. The 8MHz **BREAKTHRU 286** is unequivocally the best executed and most completely reliable speedup board manufactured today.

PCSG has since early 1983 dominated the lap portable market with ROM software such as Lucid spreadsheet and Write ROM that reviewers rated as excellent. We were proud to successfully enter the IBM PC market last year with disk access speedup software. Now we are so pleased with the **BREAKTHRU** speedup card. We use them on our own PC's to make them faster than AT's. We are really excited about this product.

PCSG makes the unabashed statement that the **BREAKTHRU 286** card represents more advanced technology than boards by Orchid, Quadram, Victor, Mountain, P.C. Technologies, Phoenix... we could go on.

But an ad can't let you experience it for yourself. That's why we sell the **BREAKTHRU 286** on a 60 day trial. If you aren't completely satisfied return it within 60 days for a full refund. It is priced at \$395. Call today with your MasterCard, Visa, American Express or COD instructions and we will ship your card the very next day. CIRCLE 489 ON READER SERVICE CARD

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**214-351-0564**



## ■ AT COMPATIBLES



The Tandon PCA is designed much like the AT, but unlike IBM's machine, the front panel of the PCA opens to allow access to all three of the half-height slots on the far right. Inside, eight expansion slots are provided. The only possibly substandard part of the machine is its keyboard, which is inconsistent in its tactile response and offers no IBM-style audible feedback.



stalled inside the unit evaluated and proved an excellent performer with a 26-millisecond average access time.

The MS-DOS 3.1 supplied with the PCA formatted this hard disk with sectors

of 1,024K bytes (instead of more-normal 512K-byte sectors). As a result, the entire capacity of the drive is accessible by DOS as one device (avoiding the infamous DOS 32-megabyte-per-disk-limit).

■ Compatibility means true AT functionality and the ability to run a wide array of software.

### PC EDITOR'S CHOICE

*As similar as this set of AT compatibles may be, they are different enough so that each excels in one or more areas. The NEC APC IV is the best integrated, the Core ATomizer the best performing, and the Tandon PCA is the least expensive. Dispensing with such mundane considerations, however, we'd buy a Sperry PC/microIT without a hard disk and plug in a Tandon or Core disk drive. Not only would we gain back part of our desktop, but also we'd get better-than-IBM performance in a delightful package.*

The Tandon keyboard was the only substandard part of the system. Based on the original AT layout with a large Enter key, no dedicated cursor pad, and Esc at the upper right, its linear-travel hard-contact keys offer little tactile feedback, give no IBM-style audible feedback, and are not uniformly sensitive. A light touch activated some keys while others required firm finger pressure. Just resting fingertips on some keys proved dangerous.

Although the PCA is the low-price leader among this foursome, it also has the fewest features.

Today, compatibility means true AT functionality and the ability to run a wide array of popular software written for the AT. All of these machines rate as true compatibles, and any one of them rates as an excellent choice as an AT alternative. XP

Winn L. Rosch is a contributing editor of PC Magazine.

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**P**C owners may be categorized in an endless number of ways, but a division that seems to spark more argument than most lies between those who use and enjoy a mouse and those who do not. Purists advocate the keyboard for all computer tasks, preferring not to move their hands back and forth between two kinds of input devices.

In the other camp there are those who, perhaps influenced by the graphics interface and capabilities of a friend's Macintosh, believe that one day every computer will be equipped with a mouse. These people rave about drawing freehand graphics, about performing massive editing jobs, and about manipulating spreadsheets as if those tasks would be impossible without a mouse. I know one user who actually believes a computer

without a mouse is like a telephone without a dialer: to get anything done, you have to go through the operator.

The truth, as you might suspect, is that not everyone needs a mouse for their PC. But with so many newcomers to computers starting out with DOS and applications manuals, the graphics interface of the mouse becomes more appealing. A knowledgeable user can program the mouse to list certain options within DOS or applications software, allowing novice users easier access to commands and data.

So, where there was once a standard—the Microsoft Mouse—sitting all by itself on the store shelves, there now sits a whole pack of mice ranging in price, feature, and performance. Here are reviews of the long-time standard and four challengers.

# A Pocketful Of MICE

*You may not think you need a mouse,  
but several new models may change your mind. Here,  
four three-button mice challenge  
long-time standard-bearer Microsoft Mouse's old-  
fashioned two-button design.*

## LogiMouse C7

LogiMouse C7 is an exceptionally smooth-moving mouse that employs the traditional ball mechanism to control the cursor within applications and to open pop-down menus. The software comes with preset menus for DOS, *Symphony*, *SuperCalc 3*, *Framework*, 1-2-3, and other popular applications, and these may be modified or used as examples in customizing or creating menus for other applications.

Installing mouse and software is simple: plug the mouse into a serial port, place the single disk in drive A:, and type Install. During testing, it took less than a minute between opening the box and opening my first menu. Everyone will appreciate this simplicity.

Using the LogiMouse with programs that support a mouse is easy because LogiMouse emulates a Microsoft Mouse, PC Mouse, or Manager Mouse depending on the driver you load. I was able to test programs that run with all three of those mice without any difficulty. If you have a program that runs with any of those mice, it will run with LogiMouse.

But what if you have an application that does not support a mouse? Using the LogiMenu program, you may create a special pull-down menu of choices for that application. Incidentally, the language used by LogiMenu is identical to that used by Microsoft's menu generator, so LogiMouse will drive Microsoft menu files. The LogiMenu language includes a Chords statement, allowing you to assign functions to



The LogiMouse C7, which is selected as the Editor's Choice in this collection of mice, offers a winning combination of price and performance. It is among the easiest of mice to install, and once up and running it will assist you in a number of software applications. The proprietary programming language, LogiMenu, is simple yet extremely powerful, helping to make the overall package a winner.



### FACT FILE

#### LogiMouse C7

LogiTech Inc.  
805 Veterans Blvd.  
Redwood City, CA 94063  
(415) 365-9852

List Price: \$99; \$119 with Plus package, including several preprogrammed utilities.

Requires: 256K RAM, DOS 2.0 or later.

**In Short:** This smooth-rolling mouse comes with excellent software support and documentation. Its performance makes it an Editor's Choice.

CIRCLE 66 ON READER SERVICE CARD



LogiMouse C7's user-definable 1-2-3 menu pops open at the cursor's screen position, so you can view and use it anywhere on the screen. A secondary and smaller menu window contains options for the Enter key and for anchoring the cursor. Other preset menus available in the software include Framework, Symphony, DOS, and SuperCalc 3.

## ■ MICE

pairs of buttons on the mouse (left and middle buttons pressed together, for example), proving the advantage of the third button.


The LogiMenu language is programmable. It is simple once you get used to its syntax by changing one of LogiTech's menus, and yet it's powerful enough to support an endless nest of submenus and context-sensitive menus that appear if certain screen conditions are satisfied. For example, you could specify that if a certain row of the screen displays a certain character string, a particular menu is displayed. The power of this function is unlimited.

LogiMouse behaved extremely well with both *1-2-3* and *PC Paint*. On the disk is a special driver for *1-2-3* that gave me the control I wanted over cursor movement and command execution. Within a *1-2-3* spreadsheet, LogiMouse's cursor takes on one of three icons, depending on its screen position. If the cursor is at the top of the screen, it is a square and the left button opens the *1-2-3* menu; if the cursor is at the edge of the worksheet, it is an arrow and the left button causes the screen to move up, down, right, or left; and if the cursor is anywhere else within a worksheet, it is a triangle and the left button causes the highlight bar to jump to its position. The center button opens a pull-down menu of options that are preset for cumbersome command sequences such as retrieving a file, graphing a file, summing a column or line, printing a range, and so forth. The right button acts as the Esc key.

The LogiMouse documentation is the best I've seen for a mouse—a bound, 175-page book that is well organized and well written, with plenty of examples to help beginners and power users alike put the power of this mouse into play. To sum up my feelings about this mouse and menu-generating system: this is the one I want.

### Manager Mouse 1001C, 1001C-KF, and Cordless

The Manager Mouse is the mechanical type, but instead of a ball on its underside it employs two wheels—one for up/down and one for left/right direction sensing. According to the manufacturer, this double-wheel mechanism will last longer than



## FACT FILE

**Manager Mouse 1001C, 1001C-KF, and Cordless**  
 The Torrington Co.,  
 59 Field St.  
 Torrington, CT 06790  
 (203) 482-9511  
**List Price:** \$139; \$179 with *KeyFree* and *Telepoint*; \$279 for Cordless model.  
**Requires:** 256K RAM, DOS 2.0 or later.  
**In Short:** These mice use direction-sensing wheels as opposed to rolling balls. This works well, but the lack of a true menu generator is a strike against the product.  
CIRCLE 699 ON READER SERVICE CARD

the ball type and requires much less cleaning than the other style.

Torrington offers three versions: just Manager Mouse and a driver emulating Mouse Systems' PC Mouse driver; mouse, driver, and *KeyFree* software for redefining the mouse functions within applica-

tions; or a mouse with no cord, plus driver and *KeyFree*. The first version is an inexpensive version of the PC Mouse. You get a driver that will let you use the mouse with existing applications for which you can select the PC Mouse.

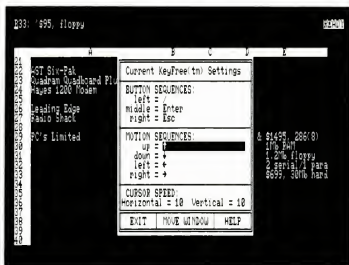
The third version is a clever idea, if somewhat gimmicky, but I'm not sure it's necessary. You mount the sensor on the side of your PC and move the mouse around without restriction of a cord, up to 4 feet. Unfortunately, the transmitter in the mouse is run by a battery that needs recharging periodically. A cord is supplied for recharging, which may be done while you run the mouse on the cord. Maybe the cord does get in my way sometimes, but it keeps me from worrying about batteries. It also prevents me from losing my mouse!

The second version, the one with the *KeyFree* menu program, allows you to define your mouse for use with programs that do not provide mouse drivers. This sounds great in theory, but in practice, you cannot generate any menus with this software.



*The Torrington Co.'s Manager Mouse comes in three versions: the standard model; the standard model packaged with *KeyFree* and *Telepoint* software; and a cordless model, which can be moved up to 4 feet. The cordless mouse does require periodic recharging, and a cord is included for this purpose.*

## ■ MICE



The Manager Mouse 1001C's KeyFree software allows you to redefine the cursor movements and button functions of the mouse with any program but does not allow you to create special-purpose menus within applications such as 1-2-3. Therefore, the mouse is hindered in its abilities to enhance popular applications software.

merely assign functions to the three mouse buttons and to the up, down, right, and left movements of the mouse. Therefore, the software doesn't do much to enhance the power of 1-2-3 or dBASE or any application for that matter.

The *Telepoint* program is good painting and drawing software that offers the expected range of options through a menu of icons. It is easy to learn by experimenting. You can create and print an endless variety of graphics with *Telepoint*.

Still, the painting program is not enough to justify the lack of a true menu generator. This mouse is a good buy if you plan to use its driver to interface with mouse-driven software or if you just want a less expensive PC Mouse. *KeyFree* isn't worth the extra money. *Telepoint* is. But you can't get *Telepoint* without *KeyFree*.

## Microsoft Mouse, Serial Version

Although Microsoft cannot be credited with inventing the mouse, it certainly deserves the credit for popularizing it among

personal computer owners. This was the first mouse available for the PC, ergonomically designed to fit neatly in the hand, which also gives it a shape more like a real mouse than any other artificial one. The feel of the Microsoft Mouse in the hand and the smooth roll of the ball mechanism, plus all that extra software you get with it,

contribute to its continuing success.

You certainly get a lot for your money with this mouse: six program disks, books on the mouse, *Microsoft Paintbrush*, and *Microsoft's Show Partner*, and a quick reference guide for three predesigned mouse menus. And you get a thorough tutorial, which is not offered with other products. The Microsoft Mouse is fundamentally different from all the other mice reviewed in one respect: it has two buttons versus three.

Installing the hardware for this serial version of the mouse is nothing more than plugging its cable into a serial port. Installing the software takes considerably longer because there are so many options. Microsoft includes an installation program that guides you through the process step by step. Thorough and clear, yes, but it takes much longer to get going with this mouse than with most others, even if you're an experienced mouse.

The mouse comes with predesigned menus for 1-2-3, *DisplayWrite 3*, and *MultiMate*, allowing you to control cursor movement and pop-open menus within those applications. In 1-2-3, the left button has two functions: moving the highlight bar to the location of the square cursor or opening Microsoft's menu along the right-hand edge of the worksheet. Basically, this menu lists all the cursor-movement controls plus the function and status keys, which I actually find easier to use directly from the keyboard in most situations. The right button opens the 1-2-3 menu and selects choices from it.

However, when I felt comfortable enough to want to generate my own menus for other programs or to customize the ones that came with the mouse, I was referred to a section of the documentation that told me to fill out a card in the package and return it to Microsoft. I have no idea why the company does not include the files and information you need to work on the menus; otherwise it's a complete mouse package.

I consider *Microsoft Paintbrush* and *Show Partner* two of the best reasons to buy this mouse. Both are excellent and work extremely well with the mouse. *Paintbrush* is a fun and easy-to-use screen-painting program with a lot of goodies, such as a wide selection of text fonts, brush



### FACT FILE

**Microsoft Mouse, Serial Version**  
 Microsoft Corp.  
 16011 NE 36th Way  
 Box 97017  
 Redmond, WA 98073  
 (800) 426-9400  
 (206) 882-8080  
 List Price: \$195  
 Requires: 384K RAM, DOS 2.0 or later.  
**In Short:** The two-button Microsoft Mouse has a good feel and a wide variety of software. It has been the standard for quite a while, but a third button seems more necessary these days.

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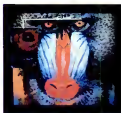
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## ■ MICE



### Mice: Summary of Features

Product/ Manufacturer	List Price	Type	Number of buttons	Power supply	Inter- face	Cord length (inches)	Mouse generator	Software included
<b>PC</b> LogiMouse C7 LogiTech Inc.	\$99	Mechanical	3	Internal	Serial	60	Optional	Drivers only
SummaMouse Summagraphics Corp.	\$119	Optical	3	External	Serial	54	●	Drivers only
Manager Mouse 1001C The Torrington Co.	\$139	Mechanical	3	Internal	Serial	58	○	Drivers only
Manager Mouse 1001C-KF The Torrington Co.	\$179	Mechanical	3	Internal	Serial	58	●	KeyFree, Telepaint
Microsoft Mouse, Serial Version Microsoft Corp.	\$195	Mechanical	2	Internal	Serial	58	○	Paintbrush, Show Partner
PC Mouse, Bus Plus Version Mouse Systems Corp.	\$199	Optical	3	Internal	Bus	65	●	PC Paint Plus
Manager Mouse (Cordless) The Torrington Co.	\$279	Mechanical	3	Internal	Serial	58	●	KeyFree, Telepaint



—Indicates Editor's Choice. ●—Yes ○—No

The usefulness of a mouse is directly proportional to its ability to operate effectively with a wide variety of software. All of the mice reviewed here

can be adapted to different programs. Some, of course, are more adaptable than others, but all are Microsoft compatible.



The Microsoft Mouse looks the most like a real mouse, and its smooth movement and consistent performance have made it the standard to which other mice are inevitably compared. The most important difference between the Microsoft Mouse and the other mice reviewed here is the lack of a third button. Because the other mice make such good use of the extra button, it seems that three, and not two, has become the standard as far as buttons are concerned.

■ *Paintbrush* and *Show Partner* are two of the best reasons to buy the Microsoft Mouse.

styles, fill patterns, erasers, and shape drawing tools. *Show Partner* allows for animation of graphics, and so you can create dazzling screen demonstrations. You can draw your own graphics or use a screen-capture utility to use any image you can display on your screen. For example, you could create a presentation consisting of many different screens of text alternating with graphics such as 1-2-3 worksheets or *Paintbrush* art files.

There is no doubt that Microsoft makes a good product. And though most software doesn't support the third button of other mice, I feel the third button can play an important role, particularly if the software lets you define the extra button within ap-

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The Microsoft Mouse driver for 1-2-3 lists its extensive range of functions along the right-hand side of the worksheet, out of your way. It is called up with the left button. The right button opens the 1-2-3 menu and selects choices from it. The mouse also comes with predesigned menus for DisplayWrite 3 and MultiMate.

plications. For my money it's a close race between the Microsoft and LogiTech Mice, but I feel the LogiMouse and LogiMenu software give me more of the simple-to-use power I was looking for in a mouse.

## PC Mouse, Bus Plus Version

The PC Mouse comes in two versions: serial and bus. I tested the bus version, which requires installing a half-length board in the system. Both versions use a special pad over which you must run the mouse—it is an optical mouse, so it must be able to "see" the pattern in the pad in order to translate mouse movement into cursor movement.

Installation begins with the half-length board, which may be inserted in any open slot. But before you open your system unit, you must first run a program and answer a few questions about your hardware configuration. This generates an easy-to-understand diagram highlighting the settings for the three jumper pins. Care must



### FACT FILE

**PC Mouse, Bus Plus Version**  
 Mouse Systems Corp.  
 2600 San Tomas Expressway  
 Santa Clara, CA 95051  
 (408) 988-0211  
**List Price:** \$199  
**Requires:** 64K RAM, DOS 2.0 or later.

**In Short:** The PC Mouse ties with the Microsoft Mouse for second place. Its mechanics work flawlessly, and it comes with a sophisticated graphics package.

CIRCLE 663 ON READER SERVICE CARD

be taken to perform this step correctly, because there are 13 possible positions for the three jumpers. On the rear of the board you will find the port where the mouse cable is plugged in.

A test program is provided to identify problems at this point. If you have selected the incorrect COM port, for example, your mouse will fail the test. In this manner, you always know the mouse is functioning before you begin installing the software

and trying to make the mouse work with various applications.

Software installation for PC Mouse is different from that of most other mice in that you don't just do it once unless you are installing the mouse for just a single application. After inserting the disk in drive A: and typing Install, you are presented with a list of installable applications: 1-2-3, MultiPlan, VisiCalc, FlashCalc, SuperCalc3, MultiMate, WordStar, PFS:Write, dBASE II and III, Microsoft Word, Symphony, Framework, Timeline, Javelin, WordPerfect, and one selection called "generic."

To install the mouse for one of these applications, either on floppy or hard disk, you enter the program's name and watch the appropriate files being copied to the disk or directory you specify. This means two things: it's almost foolproof to install the mouse for a listed application, and you have to run the installation program as many times as you have applications you wish to use with the mouse.

I tried the installation for 1-2-3 first and had no problem. Upon booting 1-2-3, the mouse controls the cursor highlight bar, the right button acts as the Esc key, the middle button acts as the Enter key, and the left button opens a pop-up menu of a dozen functions, ranging from opening the 1-2-3 menu to opening a window to bringing up the Calc menu. For the most part, I found the default choices on this menu useful, but I was happy to find I could change them easily.

I installed several other applications drivers, such as dBASE III and Microsoft Word, again trouble-free. But I began to notice that my hard disk had a set of four files for each of these applications, and I was bored sitting through the installation so many times. This is the biggest drawback to the system.

The generic driver lets you open a window within applications you do not have configured for the mouse or those that make no provision for mouse control. The window offers the ten function keys as options, and I was able to call this menu within XyWrite, Power Base, and other programs that make use of the function keys but are not configured for a mouse.

The menu generator for modifying or creating drivers is extremely powerful, flexible, and complicated in comparison to



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## ■ MICE



The PC Mouse by Mouse Systems is optical and therefore must "see" the pattern in its pad in order to translate movement from mouse to screen. Included with the system is a half-length board, which can be inserted in any available slot. The PC Mouse also comes with PC Paint Plus, a sophisticated graphics and drawing package that works very well in concert with the mouse.



PC Mouse's designer pop-up menu offers a powerful and useful selection of customizable functions and includes submenus and the 1-2-3 menu. With it, you can open a window within applications you do not have configured for the mouse or those that make no provision for mouse control. The window offers the ten function keys as options.

## ■ The PC Mouse comes with *PC Paint Plus*, a sophisticated painting and drawing program.

those of the other mice. However, the reference guide is thorough and well written, so with a little study (an hour or two) you should encounter few problems, especially if you begin as I did by modifying the drivers supplied by Mouse Systems.

The PC Mouse comes with *PC Paint Plus*, a sophisticated painting/drawing program for creating any kind of graphics, from game screens to Gantt charts. The mouse works extremely well with the software and provides an easy-to-learn graphics interface to the wide variety of commands, paints, brush styles, and so forth.

All things considered, the PC Mouse tied with Microsoft Mouse for second favorite, not far behind the LogiMouse in function and performance. The optical-sensing device and pad worked flawlessly, yielding good control over the mouse.

## SummaMouse

The SummaMouse is of the optical variety, meaning you must keep enough room on your desk for its 9- by 11-inch pad. This mouse has no "feet," no mechanical parts, no rolling ball on its underside to sense motion. Instead, it uses a pair of



## FACT FILE

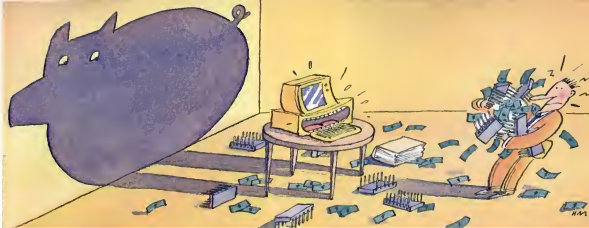
### SummaMouse

Summagraphics Corp.  
777 State St. Extension  
Fairfield, CT 06430  
(203) 384-1344  
List Price: \$119

Requires: 128K RAM, DOS 2.0 or later.

**In Short:** This optical mouse requires a separate electrical outlet. That may be a hassle, but it does not detract from the product's usefulness, especially for beginners.

CIRCLE 662 ON READER SERVICE CARD



**PROBLEM:** Most concurrent processing systems take everything you've got, and give back very little.

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Say you've started a sort routine in dBASE. Instead of waiting for it to finish, just press "Alt-Esc." Your dBASE screen instantly disappears, and up comes another DOS prompt. Simply load another program and go to work. Meanwhile, dBASE crunches away off-screen.

Press "Alt-Esc" again and dBASE pops back on while your other program continues in the background. Switch back and forth all you want.

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## ■ MICE

"eyes," or optical sensors that count the rows and columns built into the pad's design in order to move the cursor appropriately.

Optical mice have an obvious maintenance advantage: they don't collect lint, hair, dust, oil, or other contaminants. Mechanical mice, the kind with a rolling ball or pair of wheels on their undersides, require periodic cleaning. Optical mice do not. However, this optical mouse doesn't see all by itself—you must supply electricity and that means another cable coming from the back of your PC to another outlet on the wall. Personally speaking, I have no more wall outlets to spare, and I don't want to connect any more multiple-outlet power strips than I already have. If your situation is similar, you will likely settle for another mouse.

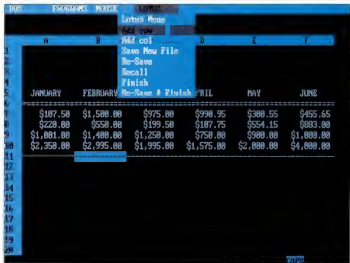
## ■ Optical mice have an obvious maintenance advantage: they don't collect lint or dust.

Installation is accomplished in five steps: plug the mouse cable into a serial port; plug the power transformer cable into the wall; copy the software to a floppy or hard disk; choose one of eight files to rename CONFIG.SM, depending on your monitor type, mouse model, and serial port (this is the only step that can be confusing. But even if you get confused, you can try renaming all eight files, one at a time, until you find the one that drives the mouse on your system); and, finally, type SM and pop down the menu.

Using my editor, I customized the pre-designed menus for DOS and 1-2-3 and added program selections for my other applications, created pop-up menus for driving XyWrite and dBASE III Plus, and added commands to my AUTOEXEC.BAT file to load the menus on boot-up, all 20 minutes. The manual is brief compared to those of most other mice, but that was because setup, customization, and operation of the mouse features were simpler than



Like the PC Mouse, Summagraphics' SummaMouse is optical and glides over its own 9- by 11-inch pad. The system works well, but it can be slightly hypersensitive, especially when used with 1-2-3. You may cause yourself to skid far out of your spreadsheet and then come crashing back into cell A1. The SummaMouse is equipped with a simple and sensible menu generator, and it emulates the Microsoft Mouse with no problems.



The SummaMouse offers pull-down menus from a bar across the top of the screen, and you may load your customized menus for different applications at seven different positions along this bar. This is by far the simplest menu generator to learn and put to use. Its language is not fancy, but you don't waste time having to learn strange syntax in order to use it.





## EDITOR'S CHOICE

Even though Microsoft created the standard and its mouse is undoubtedly a good product, it fell slightly behind LogiTech's LogiMouse C7 in power and performance. The LogiMouse, along with its LogiMenu software, provided the simple-to-use power that mouse users need. Tied for second place with Microsoft Mouse was PC Mouse with its optical-sensing device.

most other mouse manufacturers would have you believe.

Without any doubt, this menu generator was the simplest to understand and put to use. Its language is not as fancy as that of LogiTech's LogiMenu program, but you don't have to waste much time learning what to do in order to write your own menus. Even the syntax makes sense.

I used the SummaMouse with a dozen or more popular applications and it emulated the Microsoft Mouse without problems. I did not like the way the SummaMouse controlled 1-2-3, but I did like the pop-up menu—it was fine—great, in fact. My customized menu offered single click access to commonly used features such as widening columns, centering labels, printing and copying ranges, and several other functions that I feel are tedious chores on the keyboard.

However, if you leave the highlight bar in mouse mode, you have to move the mouse carefully to avoid moving too far. On several occasions, I bumped the mouse or moved it too far and ended up in column AB or row 200. Then, of course, in moving left or up too far against the borders, I would have to wait while the speaker beeped annoyingly.

The SummaMouse is a great choice for beginners who want to create a fancy graphics interface to all their programs. It doesn't take much work to get it running, and it works like a charm.

Phil Wiswell is a frequent contributor to PC Magazine.



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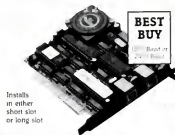


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Tallgrass's network is the LanCourier. Tallgrass introduced the LanCourier TG-8000 in June of 1986 as its network server. This server comes in a variety of configurations and can be easily up-

•

The LanCourier TG-8000 server with *VINES* networking software offers features and flexibility far beyond those of LANs running under DOS-based software. In all, this winning duo comes close to the top of the heap of LANs evaluated in the *PC Magazine* series on connectivity.

■ FRANK J. DERFLER, JR.,  
AND EDWARD HALBERT

graded with additional IBM PC standard expansion cards. Tallgrass markets Banyan Systems' *VINES* (*Virtual Networking Software*) as its network operating system (the server only runs *VINES* software). Tallgrass also markets a version of *VINES* for the IBM PC AT, which it calls the TG-8000AT. *VINES* supports the IBM Token-Ring Network and PC Network interface cards, as well as Standard Microsystems' ARCnet and 3Com's EtherLink interface cards.

For this review, *PC Magazine* evaluated the LanCourier TG-8000 server running *VINES* using 3Com's EtherLink network interface cards. We chose to test the TG-8000 system with EtherLink cards because they are currently the most commonly available of those offered with the system. Because it is the interface card

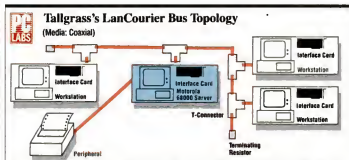
## ■ LANCOURIER

that determines the media used by the network, the configuration tested uses the EtherLink standard electrical connections and media-sharing protocols (CSMA/CD). The standard cabling is thin coaxial EtherLink cabling. The EtherLink card for PC systems is a half-size circuit board containing a VLSI Ethernet Data Link Controller Chip and the network transceiver.

All of the network pieces hook together into a bus network. Each workstation in the network has two cables that are attached to the interface card through a T-connector. The overall length of the network is limited to 1,000 feet of cable, and it is necessary to terminate the ends of the cables with special resistors.

**THE TG-8000 SERVER** The Lan-Courier TG-8000 uses a 10-MHz Motorola M68000 microprocessor, which has been proven in the industry as a good workhorse for communications applications. A base system comes equipped with 1 megabyte of RAM and a 50-megabyte hard disk that has an average seek time of 28 milliseconds. Following the Tallgrass product tradition, a 60-megabyte tape backup unit is standard equipment on all servers. Upgrades for the server system include as much as 5 megabytes of RAM and 286 megabytes of disk space with a bigger power supply installed. The TG-8000 server has six PC bus expansion slots for memory, I/O, and network cards. However, these six slots are unable to take advantage of the PC AT fast-interrupt options that are available on some network interface cards.

The server is housed in an attractive upright cabinet to conserve space. Lights indicating activity on the disk, the tape, and the data bus are located along the top of the cabinet. The data bus light shows server activity in the cached memory. On the back of the cabinet there are an RS-232C port for a console, one serial and two parallel printer ports, and up to 12 communications ports. Our system was equipped with a Wyse terminal as the system console, which monitors and controls operation of the server. But any PC running a communications package, such as *Crosstalk*, that can run in a *local* mode (using a hard-wire connection without a modem) can perform that function.



Tallgrass Technologies' (1) LanCourier TG-8000 server running under (2) VINES software adapts to the topology of the network adapter cards used with it. Our tests were done using (3) 3Com's EtherLink cards in a physical bus topology. The standard EtherLink protocol is CSMA/CD and it requires (4) thin coaxial EtherLink cabling. Each workstation has two cables attached to the interface through a (5) T-connector. You must terminate the cables at either end of the bus with terminal resistors. The VINES software can also be used in the (6) IBM Token-Ring Network with its physical star/electrical ring topology, or with Standard Microsystems' ARCnet's physical star/electrical bus arrangement.

The server comes standard with a 60-megabyte tape backup unit. A backup copy of the software comes on (7) Quick 60 tape cartridges.





**VINES SOFTWARE** VINES is based on AT&T's UNIX V minicomputer operating system, but it is designed to coexist with DOS and DOS-based applications. You see the familiar DOS prompt and are able to type DOS commands. VINES supports DOS 3.1 function calls, including record and file locking, which prevent multiple users from overwriting each other's data. VINES's NETBIOS support is an optional and separate application running on the server. Banyan explains that although DOS 3.1 and NETBIOS are often used together, not all applications need both. Tallgrass and Banyan provide versions of NETBIOS that support the use of the IBM Token-Ring Network and PC Network, Standard Microsystems' ARCnet, and 3Com's EtherLink network cards on the LanCourier TG-8000 server or TG-8000AT system.

VINES includes a default file-locking override that enables you to use programs written for DOS versions prior to 3.1 on the network. When this file-locking override is in use, the operating system locks the entire file, preventing file corruption. Simultaneous multiple access by nonnetworked programs is not possible, but one-at-a-time access is allowed. This will be a welcome feature to any office planning a network but with little to spend for new software designed specifically for a network.

VINES was written to take full advantage

of the extended disk and RAM capability, as well as the speed, of the LanCourier TG-8000's Motorola M68000 microprocessor. Because of its UNIX heritage, VINES is more powerful than DOS and is able to perform tasks that developers of DOS-based operating systems have yet to address. For example, there is no limit to the amount of hard disk storage space the operating system can address. In addition, you are not required to reconfigure the networking software when you add new workstations to the system. Instead,

## ■ VINES supports DOS 3.1 function calls, including record and file locking.

when VINES boots up it can find and activate all network cards installed in the server. A report on the console screen indicates which network interface cards are installed on the network. (You can use different cards on the same LAN.) When you want to shut down the server, VINES goes through a 60-second shutdown process, during which it saves the system's status settings, such as security level or communications options chosen, and closes all open files. If the system loses power before it shuts itself down, VINES will automatically check for damaged files and also reconfigure the system.

**USING VINES** You use the terminal or PC connected to the RS-232C operator's console port on the server to control the system, using a menu of operational programs, services, and setup options.

The network administrator gives network users access to communications, electronic mail, and network resources such as printers by setting up services. In addition, the network administrator can check the status of these services, whether they are running, initializing, or stopped, by checking a screen on the system console. A network workstation user can operate these VINES services in one of two

ways: directly with commands or by using a series of menus that pass commands directly to the file-sharing, printer-sharing, communications, and other subprograms in VINES.

**THE NETMAN OPTION** You can run an optional program, called NETMAN, on the server that provides the best diagnostic and statistical information displays we've seen on any network evaluated in *PC Magazine's* series on connectivity. NETMAN's initial menu displays the names of every server and lets you develop statistics for each. Statistics include the average server load over a 1-, 5-, and 15-minute time period. In addition, NETMAN displays the average number of messages in and out of the server and the number of messages that could not be buffered for processing—also known as *drops*. NETMAN's helpful display also shows the name and address of each network interface card, along with statistics for it. This useful feature reveals any performance differences between various types of network interfaces.

NETMAN can help you determine the need for network reconfiguration or growth. It allows the network administrator to troubleshoot the network, spot hidden performance problems, and act before complaints are received. This information is vital to the efficient operation of any network. Although the software is optional, we think it's a must for every VINES installation.

**STREETTALK** Networks generally use some sort of naming convention to identify the various stations and services on the network. The naming convention for VINES is called StreetTalk. A StreetTalk name has three parts: an item name, a group name, and an organization name. The item name can be a user name or a service name, such as DotMatrix Printer. The group-name field allows you to reference any specific group within an organization separately and uniquely and to set up a security system for that group. The organization field is the highest level of naming; this field usually contains the company name. Each organization may have many groups; and each group can have many users. An @ sign separates each field in a



## FACT FILE

### LanCourier

Tallgrass Technologies Corp.  
11100 W. 82nd St.  
Overland Park, KS 66214  
(913) 492-6002

**Workstation Requirements:** 256K RAM (512K RAM recommended), one floppy disk drive, DOS 2.0 to 3.1.

**Networking Software:** VINES.

**Prices:** LanCourier TG-8000 server with 43-Mbyte hard disk without software, \$8,495; VINES, \$1,895 including NETMAN, 3Com EtherLink cards, \$750.

**In Short:** The LanCourier TG-8000 server combined with VINES software makes a flexible and powerful LAN with outstanding communications capabilities.

CIRCLE 6 ON READER SERVICE CARD



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CIRCLE 183 ON READER SERVICE CARD

StreetTalk name; the item name comes first, then the group name, then the organization name. So John Doe, a user on an installation using VINES who works in shipping for Autocarriers Inc., would be known as "John Doe@shipping@Autocarriers" to this operating system. Luckily, the nickname feature allows you to substitute J. Doe for the longer name and still be recognized throughout the network. Any person on the network may request the names of fellow users in the same group.

**SECURITY** VINES allows the network administrator to set several levels of access privileges for each directory or subdirectory. You can let users read/write/modify, read/write only, or read only. You can grant users access to directories or lock specific users out of a directory. This security system is not as flexible in granting access privileges as Novell's *Advanced NetWare*, but it is the equal of most modern networking programs. In addition, because the console cannot access network files on the server, a would-be network snoop cannot access the server's disk files by gaining physical access to the server (as you can with the IBM Token-Ring Network).

**MESSAGES AND MAIL** VINES's message utility, Chat, is very good and is not unlike a real telephone system. You place a call to a user by pressing a function key and entering the addressee's user name. The receiver's machine beeps and a message pops up at the bottom of the screen, indicating a "call" and who it is from. You may even put a caller on hold. This feature allows you to chat in real time: you can see letters appear as they are typed. Other message systems wait to send the entire message.

The VINES Mail system operates through a menu that displays incoming memos and allows you to select appropriate actions. This mail system is very thorough and allows the user to include attachments, such as complete word processor files, to memos. It also allows you to create a mailing list. Memo recipients can even redirect memos to other users or groups.

In addition to network server functions,



## Benchmark Tests: The LanCourier TG-8000 System

The critical factor for these benchmark tests is the speed degradation that the network demonstrated under load. These tests reaffirm that the LanCourier TG-8000 with VINES is one of the most powerful microcomputer-based server/software combinations available. The system began to fall behind the other workhorse systems shown here under the heaviest loads, but you would see this difference only in a busy interactive network of 20 or more workstations. The Smart Applications test is a much more complex test than the others, using DOS record locking, block reads, and a variety of other functions. VINES, a UNIX operating system, is emulating the responses of DOS in the Smart test. Therefore, we believe that VINES's slower response times are due to this emulation process and are an indicator of performance in a complex processing environment.

### Network Speed Under Contention Test

Interface card	Software	Server	Performance Times (Times given in seconds and decimal seconds)				
			Zero stations	One station	Two stations	Three stations	Four stations
EtherLink	VINES	LanCourier TG-8000	38.81	58.60	74.86	85.07	91.23
NetWare/3-Net	Advanced NetWare 68	Novell Server 68B	71.00	83.70	94.29	103.71	115.68
ARCnet	Advanced NetWare/286	8-MHz IBM PC AT	59.45	62.14	67.83	78.21	92.56

### Network plus Server Cruncher Test

Interface card	Software	Server	Performance Times (Times given in seconds and decimal seconds)				
			Zero stations	One station	Two stations	Three stations	Four stations
EtherLink	VINES	LanCourier TG-8000	38.61	55.46	70.83	132.37	192.67
NetWare/3-Net	Advanced NetWare 68	Novell Server 68B	71.00	73.05	79.45	86.87	91.00
ARCnet	Advanced NetWare/286	8-MHz IBM PC AT	59.45	65.65	73.87	110.65	128.83

### Smart Applications Test

Interface card	Software	Server	Performance Times (Times given in seconds and decimal seconds)				
			Zero stations	One station	Two stations	Three stations	Four stations
EtherLink	VINES	LanCourier TG-8000	99.00	115.00	153.00	205.00	239.00
NetWare/3-Net	Advanced NetWare 68	Novell Server 68B	61.00	81.00	62.00	83.00	64.00
ARCnet	Advanced NetWare/286	8-MHz IBM PC AT	47.00	49.50	49.50	50.50	50.50

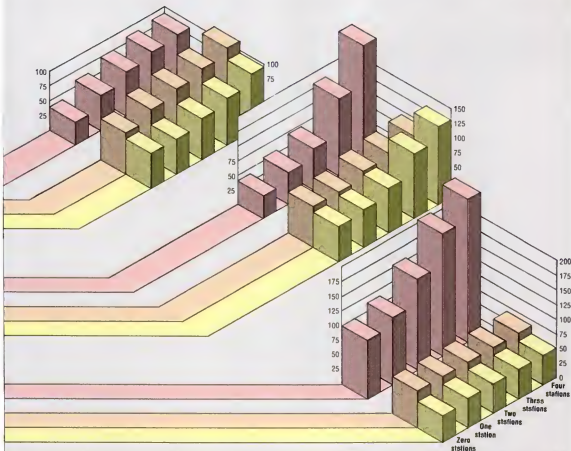
In this issue PC Labs tested the LanCourier TG-8000 dedicated server and Banyan's VINES software using 3Com's EtherLink interface cards.

For easy comparison, we include test results that appeared in "Making Connections: LANs Under NetWare," PC Magazine, Volume 5 Number 21, for Standard Microsystems' ARCnet running under Novell's Advanced NetWare/286 on an 8-MHz IBM PC AT, which received the Editor's Choice in that issue. We also include results for high performer Novell's NetWare/3-Net running Advanced NetWare 68 on the Novell Server 68B, a specialized Motorola 68000 server.

We configured all of the servers to operate only in the dedicated mode and not as dual-purpose server/workstations. The benchmark tests were run using a network of three IBM PCs, one IBM PC AT, and one

IBM PC-XT as workstations. All networking software was installed using the default configurations. No attempt was made to "fine-tune" the buffers or other parameters to achieve better performance in any one test.

For both the Network Speed Under Contention and Network plus Server Cruncher benchmark tests, the dependent variable is the time it took for the IBM PC-XT on a LAN to perform a standard set of DOS read-write commands against a single data file residing in the server. The independent variable was the network load. We began with the heaviest load, four network workstations running DOS batch files, asking for constant reads of data files from the server. Then we decreased the number of workstations one by one to reduce the network load.



The three-dimensional chart on the right shows the time it took the XT to perform the test under the varying network load on each network. For comparison, we give the time it took to run the same test on the XT's internal hard disk (Zero stations).

The difference between the Network Speed Under Contention test and the Network plus Server Cruncher test lies in the size of the data blocks that the workstations moved over the network.

The Network Speed Under Contention test exercises the network when the network interface cards and the media are heavily loaded. We attempted to eliminate the factor of server disk access time from this test by loading the network with data blocks small enough to reside in the server's cache memory on most systems. In addition, we varied the size of the data files to detect any cache limits.

The Network plus Server Cruncher test heavily loads the network interface cards, the media, and the server's disk drive access system. In this case we used data blocks of various sizes, some small, some large, when we loaded the network in order to exercise the hard disk drive access system. The results are influenced by hard disk performance and the efficiency of the networking software as it moves data on the disk and between the disk and the network interface cards.

During both of these tests, we used a hardware clock residing on an AST SixPak card in the XT to determine the starting and ending times. We did not use the system clock because its operation can be disturbed by some network functions.

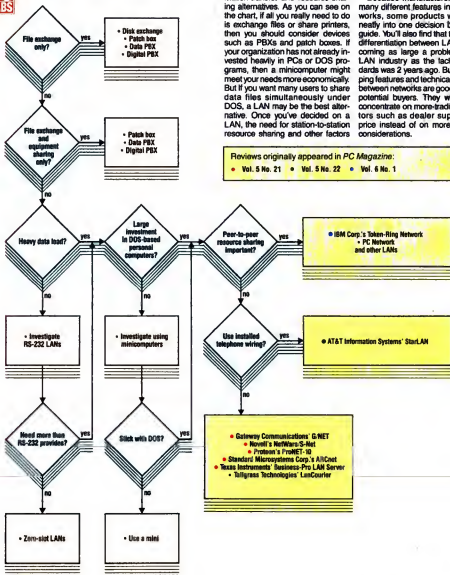
The Smart series of integrated networked programs from Innovative Software gave us a practical

way to evaluate networks under the load of typical applications. In fact, viewed on a system monitoring screen, such as *NerWare's*, the *Smart Applications* benchmark test looks and acts like a busy office, because the level of activity varies between intense use of the network and quiet periods when processing takes place.

For the department variable plotted on the three-dimensional chart, we used an IBM PC-XT operating Innovative Software's *Smart DBMS* running a script file that indexed and sorted shared database records. The independent variable was one through four workstations running another script from Innovative Software that created bursts of activity interspersed with periods of silence.



## The Connectivity Decision Guide



This chart is designed to help you select from among the many information-transfer and resource-sharing alternatives. As you can see on the chart, if all you really need to do is exchange files or share printers, then you should consider devices such as PBXs and patch boxes. If your organization has not already invested heavily in PCs or DOS programs, then a minicomputer might meet your needs more economically. But if you want many users to share data files simultaneously under DOS, a LAN may be the best alternative. Once you've decided on a LAN, the need for station-to-station resource sharing and other factors

will influence your network purchasing decision.

Because manufacturers include many different features in their networks, some products will not fit neatly into one decision box in this guide. You'll also find that the lack of differentiation between LANs is becoming as large a problem in the LAN industry as the lack of standards was 2 years ago. But overlapping features and technical similarity between networks are good news for potential buyers. They will let you concentrate on more-traditional factors such as dealer support and price instead of on more-technical considerations.

Reviews originally appeared in PC Magazine:

• Vol. 5 No. 21 • Vol. 5 No. 22 • Vol. 6 No. 1

# In Retirement Memories Abound



## Retire Your PC Coax Connection

The PC-to-host coax connection. She was a good piece of equipment working with coax cable and cluster controllers, but time just passed her by. End users started needing more than simple host access. They also needed their PCs to share resources around the office. That's when local area networks came along to fill the need.

LANs are dramatically increasing office productivity through efficient information management. And Gateways are exploiting LAN versatility by providing cost-effective host communication for PCs and other network devices. Now for thousands of dollars less, LANs and Gateways provide PC-to-PC and PC-to-host communications all without a cluster controller.

INS Gateway PC Adapters are engineered around proven INS SNA 3274 cluster controller emulation. A single INS Gateway PC Adapter in an IBM NETBIOS compatible LAN, including Token Ring, will support up to 32 logical unit sessions. The LAN allows each PC on the network to share disks, printers and other resources while the Gateway allows performance of any host-supported function and maintains host access.

INS planned on PCs becoming a major component in the development of information systems. We designed our Gateways to be the logical choice in providing the vital link between LANs and

mainframes. We also planned on much more—flexibility, simplicity and reliability. We provide free, responsive user assistance and guarantee every INS Gateway PC Adapter (hardware and software) for five years.

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CIRCLE 128 ON READER SERVICE CARD

## ■ LANCOURIER



### LanCourier: Summary of Features

PRODUCT/ Manufacturer/ Software	Installation			Network Administration				Features				Compatibility			
	Turnkey	Menu-driven	Documentation	Hours per month	Status reporting	Security	Workstation operation	Station-to-station file transfer	Printer spooling/printing	Peer-to-peer communications	Network dial-in	RAM-resident software	Smart software	GLAZE III Plus	RT-base Series 5000
<b>LANCOURIER</b> Tailgrass Technologies Corp. VINES	●	■	○	1.25	■	■	■	○	■	■	●	●	●	●	●
<b>NETWARE/3-NET</b> Novell Inc. Advanced NetWare 68	○	■	■	1.00	■	■	■	○	■	■	●	●	●	●	●
<b>ARCNET</b> Standard Microsystems Corp. Advanced NetWare/286	○	■	■	1.25	■	■	■	○	■	■	●	●	●	●	●

Indicates Editor's Choice. ●—Yes ○—No  
 Excellent—■ Good—■ Fair—■ Poor—■

The features described in this table are determined largely by the networking software. For an in-depth description of the method used to evaluate each feature, see "Making Connections: LANs Under NetWare," PC Magazine, Volume 5 Number 21. The LanCourier TG-8000 server comes ready to run; the software is preinstalled on the server. The system is extremely

flexible and has powerful communications capabilities. The troubleshooting and status displays are excellent. The system's security features are very good, but access permissions for network users could be more flexible. Features of high-ranking NetWare/3-Net and our Editor's Choice, ARCnet, are included here for comparison.

the LanCourier TG-8000, along with VINES software, provides several alternative ways to communicate outside of the network. You can attach up to eight telephone lines to the TG-8000 for various outgoing and incoming services. For example, the TG-8000 can act as an asynchronous host to PCs calling into the network. But you are not limited to dial-in host service. A PC calling into the network via modem and equipped with VINES can act as a full workstation on the network. A remote PC can perform such functions as exchanging files over the LAN or using networking programs with the standard network and DOS commands.

In addition, you can link servers on different LanCourier networks via modem over telephone lines. This link allows users on each network to use the resources of another network simply by addressing that network from their own workstations. The telephone link is usually slower than a direct wire connection but is otherwise transparent to the user.

Workstations that are physically linked to the network can share the modem on the server, using it to dial out to other asynchronous services. The VINES software will emulate VT-100, VT-52, IBM 3101,

## ■ You can attach up to eight telephone lines to the TG-8000 for incoming and outgoing services.

or TTY terminals. The SNA Gateway makes file transfer and 3270-type terminal functions available to workstations.

**INSTALLATION** For those who take pride in not reading manuals, Tailgrass provides quick-start guides that provide enough information for a fairly competent person to get a skeleton system up and running. Installing the server involves sliding a network interface card into place. This card allows the server to communicate with the interface cards in the workstation over a common media. The server comes with VINES installed. In addition, you receive a backup copy of the software on a Quick 60 tape cartridge. If you need to install the backup software, the process is as

simple as making one keyboard selection from the console and takes about 15 minutes. The ease of installing the interface cards depends on the cards that you decide to use. The EtherLink cards we used in our configuration needed no special jumper-setting modifications to run on the TG-8000 server.

The LanCourier TG-8000 is flexible and powerful. The VINES software's communications capabilities exceed those of Novell's *Advanced NetWare* or IBM's *PC Local Area Network Program*. Frankly, this system equals our Editor's Choice network, Standard Microsystems' ARCnet running under Novell's *Advanced NetWare/286* on an 8-MHz PC AT, in almost all areas. However, the ARCnet system maintains a slight edge in price, ease of use, and performance. Although we will stick with our Editor's Choice of ARCnet, the LanCourier will certainly serve you well.

Frank J. Dersler, Jr., is a contributing editor of PC Magazine. Edward Halbert is a microcomputer programmer specialist for the Northern Virginia Community College system. He has also been a contributor to PC Magazine's *Power User* column.





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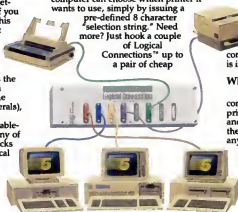
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you probably already have wired all over the building). And each computer can choose which printer it wants to use, simply by issuing a pre-defined 8 character selection string.\* Need more? Just hook a couple of Logical Connections™ up to a pair of cheap

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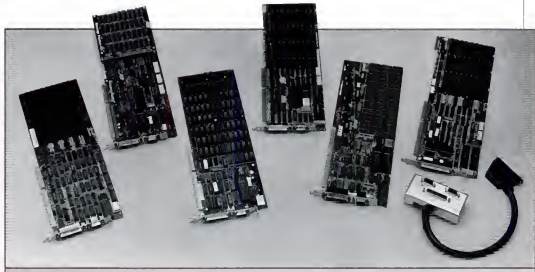
# AT

## MULTIFUNCTION BOARDS: PUTTING MORE MEMORY TO WORK

*Today you can finally put memory  
to work beyond DOS's 640K-byte limit.  
These products help you do just that and get more  
of the power you paid for when you bought your AT.*

To those accustomed to the memory limits of DOS (or worse, CP/M—does anybody remember CP/M?) the memory offered with the introduction of the AT seemed to spread out as wide as the great American Southwest. But after the impact of the possibilities of multiple memory megabytes wore off and we scrutinized the AT more closely with somewhat jaded eyes, we quickly discovered that most of the new territory was desert. Nothing could survive in the RAM area beyond DOS's 640K bytes except the VDISK disk emulator.

With the passing years, though, PC product developers have moved in, and the new memory territory has been tamed by new software, powerful operating systems like Xenix, new memory-paging techniques, and memory-emulation drivers. True multitasking has finally arrived (in the guise of *DESQview* and *Concurrent PC DOS*) and more systems are in the offing, including the long-rumored and eagerly awaited multitasking version of DOS. At last, all of that promised land is



Placed side by side, these AT multifunction boards display a wide variety of memory expansion strategies that can increase total memory capacity anywhere from 512K up to two megabytes (with corresponding costs).

From left to right: Intel's Above Board PS/AT, AST's Advantage Premium, Tecmar's Maestro, Sigma Designs' Maximizer AT, STB's Rio Grande, and Quadram's Quadboard-AT with its port attachment.

## MULTIFUNCTION BOARDS



### AT Multifunction Boards: Summary of Features

Product/ Manufacturer	List price of board with maximum memory	Maximum memory on board	Maximum memory on daughtercard	EMS memory option	EMS memory option	Standard serial ports	Optional serial ports	Game port
Maximizer AT Sigma Designs	\$395*	2 Mbytes	2 Mbytes	○	○	2	1	Optional
Rilo Grande STB Systems Inc.	\$989	1.5 Mbytes	None	○	○	2	1	Optional
Quadboard-AT Quadram Corp.	\$990	1.5 Mbytes	2 Mbytes	●	○	1	None	None
Above Board PS/AT Intel Corp.	\$1,095	1.5 Mbytes	2 Mbytes	●	○	1	None	None
PC Advantage Premium AST Research Inc.	\$1,095	1 Mbyte	1 Mbyte	●	●	1	1	Optional
Maestro Tecmar Inc.	\$1,395	2.5 Mbytes	None	○	○	2	None	None

PC — Indicates Editor's Choice. ● — Yes ○ — No

\*Price with zeroK bytes of memory; 2-Mbyte memory level is achieved through stackable daughtercard.

Although there are some striking differences among the multifunction boards gathered for this article, they do share some basic design similarities. All six boards require a full (14-inch) AT expansion slot, and all take advantage of the high-

speed abilities of the AT's 16-bit data bus. Each one features extended memory options and offers one parallel port. The major area of diversity is in the strategies they employ to carry as much memory as possible. Some jam as many chips as possible

onto a flat plane, while others rely on daughtercards to add capacity. The price listed here refers to boards configured with maximum memory. Each company offers several memory options, and their prices are listed in the fact files.

beginning to live up to its promise.

Before you can even think about building new projects on the potentials of the new RAM landscape, however, you've got to have the memory with which to work. And that's where this six-pack of AT multifunction products comes in.

All of them can extend any AT's memory by a megabyte or more and can put real computer power into your hands. Along the way, they earn their classification as true multifunction boards by contributing printer and communications ports—and sometimes more—so you can put all that power to work in the real world.

As with any products that share a common purpose, these boards share many of the same design characteristics. Without exception, they require one full (14-inch) AT expansion slot, and all take advantage of the high-speed abilities of the standard AT 16-bit data bus. They're also tall (standard AT height), so none will fit inside the new IBM XT Model 286 or similar low-slung compatibles.

Beyond the real estate, however, these

AT multifunction boards are about as different as a single-product category can be. Some, like Tecmar's Maestro, try to squeeze as many chips as possible onto a single plane. Others, like Sigma Designs' Maximizer AT, go high-rise and connect with plug-in daughtercards to push single slot capacities up to 4 megabytes. Most allow you to slide multiple boards into a single AT so that you can side up to its 16-megabyte addressing limit. Others believe that as far as adding memory expansion goes, once is enough.

Differences arise in peripheral considerations like ports, too. Although all of these products contribute a minimum single serial and parallel enhancement (which is part of our definition of an AT multifunction board), some go further, and all have their own little twists.

Serial ports, for instance, may be implemented with IBM's AT choice, the 16450 UART (universal asynchronous receiver/transmitter) chip, or the older, slower 8250 (which in IBM guise dies at speeds in excess of about 9 MHz). Either

chip choice offers full IBM software programmability for bit rates from 50 to 9,600 per second, parity, stop bits, and word length.

The biggest and most important difference between these boards is the hardware and software memory support that their manufacturers offer. AST goes all the way and includes the ability to handle enhanced EMS (expanded memory specification) memory. Both Intel and Quadram support full EMS abilities. The rest leave you with DOS and extended memory, which can be converted to EMS with software from other suppliers (like the *Virtual Expanded Memory Manager* available from Fort's Software).

The software included with the hardware is another major difference between these products. AST gives you the most: a complete multitasking operating environment. Sigma Designs provides the least—nothing but a print spooler that is stuck in the DOS memory area.

What follows is a quick look at some of the features, strengths, and weaknesses of

the multifunction products currently vying for slot space in your AT.

## Advantage Premium

The premium that AST includes with its Advantage Premium AT multifunction board is the program *DESQview*, which takes advantage of the enhanced EMS abilities of the board. Not only does enhanced EMS let you use memory beyond the DOS 640K-byte limit for data storage (using programs which, like *Symphony*, have been written to use the extra bytes), but also it permits programs to execute in the added RAM area.

*DESQview* brings the tremendous possibilities of enhanced EMS to life, enabling you to run any conventional program that operates under DOS 2.0 or later in the expanded memory area. In addition, you get genuine multitasking abilities and can instantly switch between one program and another—all without sacrificing the immense DOS software base.

On the hardware level, the Advantage Premium is the worthy offspring of AST's famed SixPakPlus. Built with the same quality, it features 1 megabyte of RAM soldered to the board in four nine-chip, parity-checked banks of 256K-bit DRAM (dynamic RAM) chips. A daughterboard adds four more identical memory banks for a total of 2 megabytes per slot. The chips used on the sample board we received were rated at 120 nanoseconds, and AST asserts that the Advantage Premium will operate at 8 MHz.

Standard equipment includes a standard IBM parallel port, configurable as LPT2 or

LPT3 in systems with monochrome display adapter, or as LPT1 or LPT2 in systems lacking one, and a serial port derived from a 16450 UART chip that functions as either COM1 or COM2 using an AT-style male DB-9 connector. Either of the standard equipment ports can be disabled to avoid conflicts with other expansion products. A second serial port and a game port are optional additions.

Configuring the Advantage Premium involves dividing up its entire memory between conventional and expanded. To AST, conventional memory includes the 640K base memory accessible by DOS and the extended addressing area of the AT's 80286 microprocessor in protected mode. The board is automatically configured during setup to use as much of its RAM as is necessary to fill DOS to its limit and consign the rest to extended memory. Thus, it can backfill 256K- and 512K-byte ATs to their DOS 640K limit.

For best operation of *DESQview*, however, AST recommends disabling part of the host AT's normal memory endowment, giving 384K of the Advantage Premium's RAM to DOS and leaving the balance for expanded memory. This configuration gives *DESQview* more memory to page in and out of.

Programs that run in extended memory are not sacrificed by this arrangement because AST includes an unusual extended memory emulator: a software driver that allows expanded memory to work like extended memory.

In addition to *DESQview*, AST supplies several software utilities with the Advantage Premium, including two RAM-disks (a floppy disk emulator and a hard disk emulator which runs in DOS or extended memory), a print spooler (for DOS or extended memory), an automatic setup and installation program, the extended memory emulation driver, and the enhanced EMS memory driver. The product is blessed with a two-year warranty.

AST's astute choice of software makes the Advantage Premium the product of choice for getting the most value from enhancing your AT's memory. It will endow your system with true multitasking abilities, and you needn't wait for the promised multitasking version of DOS, rumored to be as much as a year off.



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CIRCLE 512 ON READER SERVICE CARD



## FACT FILE

### Advantage Premium

AST Research Inc.  
2121 Alton Ave.  
Irvine, CA 92714  
(714) 863-1333

**List Price:** With 512K memory, \$495; with 1 Mbyte, \$1,095; with 2 Mbytes, \$1,495.  
**Requires:** IBM AT or AT compatible, ccc full-size slot

**In Short:** AST's astute inclusion of *DESQview* with its high-quality board gives it true multitasking capabilities.

CIRCLE 579 ON READER SERVICE CARD

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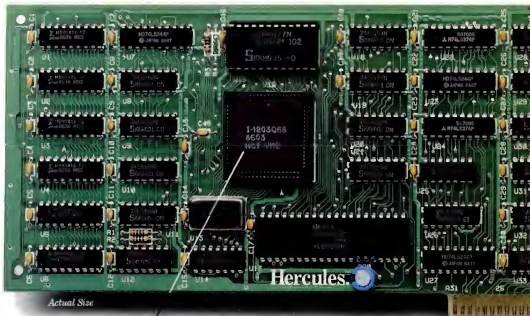
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Actual Size

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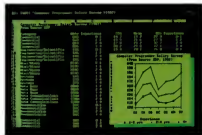
Call 1-800-532-0600 ext. 214 for the name of an Authorized Hercules Dealer near you and we'll rush you our free info kit.

CIRCLE 146 ON READER SERVICE CARD

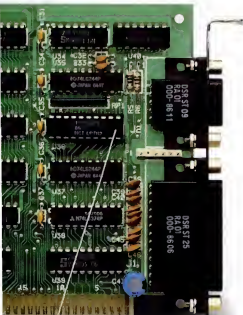
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CIRCLE 132 ON READER SERVICE CARD

## ■ MULTIFUNCTION BOARDS

### Above Board PS/AT

Intel can rightly be called the real brains behind the PC because it developed the microprocessors that power the entire IBM desktop lineup. Intel was also one of the important driving forces that developed EMS memory.

Understandably, then, the Above Board PS/AT incorporates expanded memory along with conventional DOS and extended memory. The Above Board PS/AT can thus give programs that use EMS (like 1-2-3, Release 2, and SuperCalc3, Version 2.1) the ability to stretch out and roam among the megabytes.

A single Above Board PS/AT can add up to 1.5 megabytes of total RAM to any AT and most compatibles. A daughtercard will double that endowment.

Intel allows Above Board memory to be split in several ways. One configuration allows 128K bytes to be devoted to conventional memory to fill out 512K ATs to their full DOS capacity. (It will not backfill 256K ATs.) Or any amount of Above Board RAM, from none to all 1.5 megabytes, can be allocated to extended memory in 512K blocks. The remaining on-board RAM can be used for EMS.

The parity-checked memory chips are mounted in six columns of nine chips each. All RAM chips are socketed. The 16-bit structure of the AT requires that banks be filled in pairs, so an Above Board can operate with zero, two, four, or all six banks filled.

One DIP switch allows you to configure the Above Board PS/AT to use either 256K or 64K memory chips. All chips on



### FACT FILE

#### Above Board PS/AT

Intel Corp.  
5200 Elam Young Pkwy.  
Hillsboro, OR 97123  
(503) 629-7364

**List Price:** With 128K memory, \$595; with 512K, \$695; with 1.5 Mbytes, \$1,095.  
**Requires:** IBM AT or AT compatible, one full-size slot.

**In Short:** A good choice by virtue of its EMS capabilities and quality design. The 5-year warranty is a big plus, too.

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the board must be the same size. Intel specifies a minimum speed rating of 150 nanoseconds for chips (those installed on the sample board were of that rating) or better. For the convenience of folks who prefer to flesh out their memory boards themselves, the documentation includes a list of memory chips successfully tested with the Above Board PS/AT.

The Above Board PS/AT also includes a standard IBM parallel port, which can be designated as either LPT2 or LPT3 in systems with a monochrome display adapter or as LPT1 or LPT2 in systems without one. An AT-style serial port based on a 16450 UART chip and using an IBM-style male DB-9 connector is also available. This port can be configured as either COM1 or COM2.

Intel includes a good dose of useful software with the Above Board PS/AT. In addition to the expected print buffer (which operates in either conventional or

EMS memory), a RAMdisk program (also for conventional or EMS memory), and an EMS driver (which enables the Above Board expanded memory), you get a menu-driven setup program and a diagnostic test designed to zero in on bad memory chips.

The overall quality of the Above Board PS/AT and its workmanship are nothing short of outstanding. The high-quality standard flags only in its documentation. Although the accompanying manual is well written and, from a purely verbal standpoint, easy to understand, it is poorly and rather ambiguously illustrated, and it is printed badly, as well.

The EMS abilities and quality design of the Above Board PS/AT make it a good choice for expanding any AT. If you still have doubts about the longevity of PC expansion products, the Above Board PS/AT's 5-year warranty should let you sleep in peace.

## Quadboard-AT

Quadram's Quadboard-AT is a mix of clever and unlightened design. It will suffice to add up to 1.5 megabytes (or a total of 3.5 megabytes with the addition of two daughter memory cards), a parallel port and two serial ports to your system. A special software driver is supplied to make its extended memory function under the EMS specification. It can also backfill DOS memory, but its design can waste RAM along the way.

Quadram divides memory into three banks of 18 chips each, all of which are socketed. Up to two daughtercards will add two additional banks each.

Two of these banks can be filled with 64K- or 256K-bit chips; the rest should be filled with 256K-bit chips. Quadram requires the use of 150-nanosecond chips and provided them in all three banks on the sample board supplied.

Note that the 2-year Quadram warranty

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## ■ MULTIFUNCTION BOARDS

applies only when 1.5 megabytes of RAM are factory installed. Otherwise the warranty is a single year.

The memory of the Quadboard-AT can be used to backfill ATs with 256K or 512K bytes up to their full 640K DOS capacity. However, with nothing but 256K-bit chips on the Quadboard-AT, some memory will be wasted (128K for 256K systems and 384K in 512K systems).

In the case of 512K ATs, waste can be eliminated by using a bank of 64K-bit chips, but Quadram's design makes even this inconvenient. The 64K-bit memory banks must be the last in the system, so each time you add a daughtercard, you must transfer the smaller memory chips to the last daughtercard. Although Quadram attributes the backfilling problem to the 16-bit structure of the AT, other manufacturers have solved the problem much more elegantly—and with no wasted RAM.

The rest of the extended memory RAM on the Quadboard-AT can be assigned any starting address on a 512K boundary within the 16-megabyte range of the AT. A DIP switch on the Quadboard-AT allows you to switch off RAM parity-checking so that single-bit RAM errors won't crash the system with a Parity Check 2 error (although they may later crash the system). Another switch enables the Quadboard-AT RAM to function as EMS memory.

According to the instructions supplied with the board, its parallel port can be assigned either as LPT1 or LPT2. Testing revealed these designations only apply in

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## FACT FILE

### Quadboard-AT

Quadram Corp.  
One Quad Way  
Norcross, GA 30093  
(404) 923-6666

**List Price:** With 0K memory, \$500; with 128K, \$540; with 512K, \$630; with 1.5 Mbytes, \$990.

**Requires:** IBM AT or AT compatible, one full-size slot.

**In Short:** The Quadboard-AT's design (with all 256K chips) inherently wastes some RAM. The Quadmaster III software, however, is complete.

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—PC Magazine  
Sept. 16, 1986

systems with no monochrome display adapter installed. The two standard serial ports are assigned as COM1 and COM2. Any of the three ports can be defeated to avoid compatibility problems with other equipment.

A single DB-62 connector is mounted on the card-retaining bracket of the Quadboard-AT. A shielded cable (about a foot long) plugs into this connector and terminates in a small metal box on which are mounted two AT-style nine-pin serial connectors and a parallel connector.

The box is designed to hang on the top lid of the host AT's back panel. No other means of securing the connector box is available, so its installation does not instill a great deal of faith.

In addition to the expanded memory driver, the *Quadmaster III* software included with the Quadboard-AT also includes a RAMdisk program that can create an unlimited number of virtual disks either in conventional, expanded, or extended memory, separate serial and parallel printer spoolers, and a parallel-printer port-swapping program.

The Quadboard's documentation deserves particular note. Written to be easy for nontechnical people to understand, it sacrifices completeness and organization to its goal.

## Maximizer AT

In addition to the 128K bytes to 2 megabytes that the Sigma Designs Maximizer AT will grant to any AT (up to 4



FACT FILE

### Maximizer AT

Sigma Designs  
46501 Landing Pkwy.  
Fremont, CA 94538  
(415) 770-0100

List Price: With 80K memory, \$395;  
Maximax AT daughtercard to achieve 2 Mbytes of memory, \$125.

Requires: IBM AT or AT compatible, one full-size slot.

In Short: The notable features of the Maximizer AT are its versatile communications ports that have the ability both to send and to receive data.

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## ■ MULTIFUNCTION BOARDS

megabytes with an optional daughtercard), the card also features extremely versatile communications ports.

Unlike IBM printer ports, the Sigma parallel port operates bidirectionally. It can both send data out (as to a printer) and receive data from other devices. The standard serial port and optional second serial port of the Maximizer AT can be configured to any of eight different system input/output addresses. An optional game port completes the package.

The memory allocation of the Maximizer AT is designed for backfilling partially populated host computers. The first bank of the four double rows of 18 sockets for parity-checked RAM chips can be devoted to backfilling the host. To flesh out 512K-byte ATs, this bank is filled with 64K-bit RAM chips. To top off 256K ATs, this bank is given 256K-byte chips, which wastes 128K bytes of memory.

The other three banks on the Maximizer AT, and the fourth bank when it's not for adding base memory, are devoted solely to extended memory. The sockets can be filled with either 64K- or 256K-bit chips, providing the same size is used throughout the board (and on the optional daughtercard). Memory must be added one full bank at a time.

With 64K-bit chips, possible board capacities include 128K, 256K, 384K, and 512K. With all 256K-bit chips, possible capacities include 512K, 1,024K, 1,536K, and 2,048K (2 megabytes). Sigma specifies that 150-nanosecond DRAM chips be used on the Maximizer.

Both starting and ending addresses of the memory of the Maximizer AT can be set with DIP switches, so you can add more than one card to a system and not even have to use its entire installed capacity. Another switch allows defeating the parity checking of the chips on the Maximizer card.

The parallel port will function identically to an IBM printer port and uses the same style connector (female DB-25) mounted on the card retaining bracket. The port can be assigned as either COM1 or COM2 in systems without a monochrome display adapter or as COM2 or COM3 in systems with that adapter. The port may also be switched off. Further, the port can be made bidirectional by cutting a trace and solder-

## MEMORY MATTERS

*By any other name, memory is still memory.*

Once a simple matter of bytes and RAM, memory enhancement has engendered a goulash of terms that describe how electronic storage is made available to and used by your computer system.

The most basic form of PC memory is that which is directly manipulated by the DOS operating system. Sometimes termed *conventional memory*, *base memory*, or *real-mode memory* when referring to the AT, the DOS memory area is a contiguous block of 640K bytes cut from the 1 megabyte of memory that can be directly addressed by the 8088 microprocessor used in the first generation of PCs.

Because of the 8088's addressing scheme, it can directly access two-to-the-16th-power memory bytes (which works out to 1,048,576 bytes, generally termed 1 megabyte). IBM reserved the upper 360K bytes of this memory for the system BIOS (basic input/output system), BIOS add-ons (such as those used by hard disks and the EGA), and display memory.

The 80286 microprocessor used in the AT has 24 address lines and can handle 16 megabytes of physical memory. The 80386 has 32 address lines and can handle 4 gigabytes of physical memory.

ing a jumper wire to the Maximizer AT board, Sigma Designs notes that you'll have to write your own programs to take advantage of this feature.

The Maximizer AT serial ports, based on the 16450 UART chip, can each be assigned one of eight port addresses including the two that are recognized by DOS, COM1 and COM2. Setting both the port address and interrupt used requires moving jumpers. The ports may be switched similarly.

Sigma Designs includes scant software with the Maximizer AT, merely a print spooling program that operates solely in DOS memory. The overall documentation rates as about average, confusing only in

Both of these advanced microprocessors give priority to the first megabyte they can address and use it in real mode that operates similarly to the 8088.

A technique called paging allows the 8088 to use memory beyond its physical addressing limit. Paging allows banks of memory to be switched into its addressing area and out again as needed.

Two standards have been agreed on by various parties for paging 8088-style memory. The expanded memory specification (EMS) allows the paged memory area—usually called expanded memory—to be used for data. Enhanced EMS, a superset of EMS, adds enough refinements to permit programs in the paged memory to execute properly. Programs must be specially written to take advantage of either EMS or enhanced EMS memory. However, some programs like *DESQview* can adapt standard DOS programs to execute in the enhanced EMS area.

The memory that the 80286 and 80386 can address beyond the 1-megabyte base is usually termed extended or protected-mode memory. The 80386 adds an additional virtual memory mode. These memory areas are all beyond the reach of DOS and most of today's application software. —Winn L. Rosch

its discussion of DRAM chip sizes: it uses the same abbreviation, KB, indiscriminately to mean both kilobyte and kilobit.

## Rio Grande

The STB Rio Grande is a straightforward multifunction board with few frills but just about every installation option you might need. Its glory is its clever software support that allows you to create nonvolatile RAMdisks.

The Rio Grande hardware allows AT memory expansion up to 1.5 megabytes using a single board. It will also add a parallel printer port and a serial communication port. A second serial port and a game adapter are optional.

Memory on the Rio Grande is arranged in three 18-chip rows. The board can use either 64K- or 256K-bit chips or a combination of one bank of 64K-bit chips and two banks of 256K-bit chips. It requires the use of chips rated at 150 nanoseconds or faster; 150-nanosecond chips were installed on our sample. All chips are socketed, and the board can be partially filled, providing each memory bank is completed. Total board capacity can thus be adjusted to either 128K, 256K, 384K, 512K, 640K, 1 megabyte, or 1.5 megabytes.

Two DIP switches allow you to configure the Rio Grande to match nearly any AT system, including those with existing extended memory. The board is capable of backfilling DOS memory up to 640K on host ATs with either 256K or 512K bytes of RAM installed on the system board. The rest of the memory on the Rio Grande can be assigned any address on a 128K

paragraph within the complete addressing range of the AT.

The serial ports are based on the 8250 UART chip and can be switched off or configured as either standard DOS port, COM1 or COM2. The parallel port can also be switched off or assigned as LPT1 or LPT2 in systems with a monochrome graphics adapter or as LPT2 or LPT3 in systems with that adapter. The standard IBM AT-style connectors are installed on the retaining bracket of the card: male DB-9 for serial and female DB-25 for parallel. The optional ports are switched to connectors on a supplemental bracket.

Overall construction is generally high quality. Certain details lack professional finish, however. The header on which port-assignment jumpers are adjusted appears to have been chewed down to size. The serial-port timbase crystal is somewhat oversized and loosely mounted. However, the 2-year warranty of the Rio

Grande should allay any fears about the product's ultimate quality.

STB includes a newer version of its highly regarded PCA software with the



## FACT FILE

**Rio Grande**  
STB Systems Inc.  
601 N. Glenview, #125  
Richardson, TX 75081  
(214) 234-8750

**List Price:** With 0K memory, \$315; with 128K, \$365; with 256K, \$435; with 384K, \$505; with 512K, \$495; with 1 Mbyte, \$739; with 1.5 Mbytes, \$989.

**Requires:** IBM AT or AT compatible, one full-size slot.

**In Short:** A no-nonsense board with every installation option you'll ever need and excellent software support as well.

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(714) 898-0525

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## ■ MULTIFUNCTION BOARDS

Rio Grande. The PCA semivolatile RAMdisk emulator is unusually versatile. It can be configured to operate in either extended or expanded memory (the Rio Grande does not, however, have expanded memory capabilities), it can drive up to ten 360K virtual floppy disks (which act so much like real disks you can format them and install the DOS operating system on them), and the disks and their contents will survive a warm boot (pressing Ctrl-Alt-Del). Of course, all data on the disks is lost when the host computer is switched off.

PCA can be configured to add password protection to your AT. The system requires you type a password as it boots or else your computer turns into a vegetable. (Of course, as with any simple password scheme, this one can be circumvented by using a floppy disk without the PCA program on it to boot the system.) PCA can also set up a print spooler (buffer) in either extended or expanded memory and give direct keyboard control of several printer functions (suspend printing, dump buffer contents, even switching LPT1 with LPT2).

With STB's Rio Grande, you get yeomanly hardware that's adaptable to any system, along with some very clever software features.

### Maestro

Tecmar's Maestro packs more memory onto a single layer circuit board—up to 2.5 megabytes—than any other AT multifunction product. In addition, it adds both serial and parallel ports.



## FACT FILE

### Maestro

Tecmar Inc.  
6225 Cochran Rd.  
Solon, OH 44139  
(216) 349-0600

List Price: With 0K memory, \$399; with 128K, \$589; with 384K, \$695; with 1.6 Mbytes, \$1,095; with 2.5 Mbytes, \$1,395.  
Requires: IBM AT or AT compatible, one full-size slot.

In Short: The Maestro can carry more memory by itself, 2.5 Mbytes, than any of the other boards reviewed here.

CIRCLE 18 ON READER SERVICE CARD

## ■ With STB's Rio

Grande you get yeomanly hardware that's adaptable to any system.

The immense capacity of the Maestro is attributable to an unusual arrangement of five partly checked 18-chip banks of DRAM chips. The neatly ordered rows of chips do not exactly correspond to the memory bank designations. Adding chips requires reference to a road map to master.

The Maestro uses a combination of 64K- and 256K-bit chips, depending on the amount of memory in the host AT it is supposed to enhance. Using one or more banks of 64K-bit chips, it will backfill either a 256K or 512K-byte AT with no wasted storage. Maximum system memory capacity using a Maestro and a 256K AT is 1,664K; with a 512K AT, it's 2,688K. Other combinations of chips allow intermediate capacities, including enhancing 640K ATs in banks of 512K bytes up to the Maestro's 2.5-megabyte limit.

No provision is apparent for using more than one Maestro to increase system memory capacity beyond that available on a single board.

The Tecmar documentation requires the use of 200-nanosecond or better chips on the Maestro. The sample board was factory equipped with 150-nanosecond chips.

All memory assigned beyond the DOS 640K-byte limit is used as extended memory. No facility is provided for using it under EMS memory.

The parallel printer port follows the IBM standard and uses a female DB-25 connector on the retaining bracket of the Maestro card. It can be assigned as either LPT1 or LPT2 in systems with no monochrome display adapter or as LPT2 or LPT3 in systems with that adapter, or it can be switched off entirely.

The single serial port of the Maestro is unusually versatile. Two connectors are provided, but both serve a single port. One connector, on the Maestro retaining bracket,

follows the IBM AT standard and uses a male DB-9 connector. A PC-XT-style male DB-25 connector is screwed to an additional retaining bracket that can be mounted in any slot or can share the slot used by the AT disk controller.

The serial port can be assigned as COM1, COM2, COM3, or COM4, though only the first two are directly usable by DOS. Further, an unusual jumper arrangement allows the port to be configured as either DTE (data terminal equipment) like normal IBM serial ports or as DCE (data communications equipment). The choice may eliminate the need for



## EDITOR'S CHOICE

*Although any of these multifunction boards will enhance your AT with more memory and ports, the most useful is AST's Advantage Premium because of its high-quality construction and support of the full enhanced expanded memory specification (EEMS), which allows standard DOS programs to execute in its memory addition. With the DESQview software supplied for the Advantage Premium, you can turn your AT into a genuine multitasking system today using standard DOS software.*

"null modem" or crossover cables when connecting some serial devices to this port.

Tecmar provides its *Treasure Chest* of software with the Maestro. The RAMdisk emulator and print-spooler utilities included in the package make use of extended memory. The rest of the *Treasure Chest* programs, from pop-up utilities like *Slide-Kick* to games, run in the normal DOS memory area.

The Maestro appears well made and is covered by a 1-year warranty. The Maestro installation and technical reference manual rates as one of the most clearly written PC user manuals I've encountered.

Winn L. Rosch is a contributing editor of PC Magazine.

# QuadEMS+ "The Right Way To Do Memory"

Stewart Alsop, P.C. Letter

Computer experts are praising QuadEMS+ as the smartest new memory product for the IBM Personal Computer. With the QuadEMS+ package from Quadram you extend the life of your personal computers with increased power and capability. QuadEMS+ turns even old PCs into

top-of-the-line performers. It's the fast, cost-effective way to make the most of the PCs you've got.

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For more information on the board the computer experts are praising, visit your local computer dealer and ask about QuadEMS+. Or contact us at One Quad Way, Norcross, Georgia, 30093, 404-923-6666.

## Productivity

Concurrent PC DOS XM comes as a bonus with QuadEMS+. It supports expanded memory and multitasking so you can run up to four of your favorite DOS applications at the same time without modification. Its windowing capability, programmable function keys, and menu-driven design make Concurrent PC DOS XM easy to use.

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CIRCLE 463 ON READER SERVICE CARD

■ PC LAB NOTES: THE DOS DIR COMMAND ■ MICHAEL J. MEFFORD AND CHARLES PETZOLD

# MAKING DIR DO DOUBLE DUTY

*With switches and filters DIR can do more than you think, and with the programs presented here you can compare two directory listings simultaneously.*

Of all the DOS commands, DIR probably provides the most information per keystroke. Every newcomer to the PC learns in his first 10 minutes how to take a directory of the drives on his machine and—as soon as he learns what a path is—how to use DIR on his subdirectories, as well. Hard disk users quickly pick up the trick of using

DIR \\*.

to list their subdirectories, though this clutters the listing somewhat by including files that have no extension.

Using DIR becomes such second nature, indeed, that many users fail to take advantage of the command's additional capabilities. For example, how many times do you reach (too late, as always) for Ctrl-NumLock to stop a fast-moving directory listing because you didn't think far enough ahead to type

DIR/P

to prevent the scroll at the end of each screenful? And now that you've got a hundred or so files in a directory you should have cleaned up but haven't, do you remember that

DIR/W

will display 115 filenames on one screen? (If the /W switch isn't enough, you can add the /P switch, as well.)

In this article I'll assume these basics and go on to discuss the use of DOS filters with DIR, the meaning and use of the dot and dot-dot entries in subdirectories, and the basic DOS structure of directory list-

ings. After that, I'll present a program that will enable you to compare the listings of two directories right on-screen.

[And, not to be outdone, contributing editor Charles Petzold has included his own, somewhat different directory-comparison program, with a discussion of the reasons why he took an alternative route in the programming—Ed.]

**FINDING WHAT YOU WANT** FIND .EXE and SORT.EXE are two DOS "filters" that can also enhance your use of DIR. (Unlike DIR, FIND and SORT are "external" DOS commands, which means simply that you must have them as files on your disk or path in order to use

them.) If you need a listing of subdirectories only, for example,

DIR | FIND "<"

will eliminate all the unwanted filenames that have no extensions, which the more usual

DIR \\*.

includes. This works because the "<" symbol begins every DIR listing of a subdirectory and is an illegal character in any regular filename. FIND can also be used to restrict the DIR output listing to filenames that share a common string by putting that string inside the FIND quotes. Similarly, by using the FIND/V switch, you can exclude DIR listings you don't want. For example, to see all the files except your subdirectories, you could simply enter

DIR | FIND/V "<"

Similarly, when you want to order the DIR listings, SORT.EXE is often sufficient. By itself,

DIR | SORT

will alphabetize the display listing, based on the first letter of each filename. If instead you use

DIR | SORT/+10

instead, the alphabetic sorting will be done by extension. The /+10 tells SORT to start with the tenth column, which is the first character of the extension; to sort by size, you'd use /+14. And with any of these, you can invert the displayed order by add-

## PRODUCTIVITY INDEX

### PC LAB NOTES

Getting the most out of DIR with filters and switches

### PROGRAMMING/UTILITIES

A command that counts the letters, words, and sentences in text files

### SPREADSHEET CLINIC

Graph quickly in *Symphony*, and

increase menu choices in *1-2-3*.

### POWER USER

Set printer controls with *SideKick*; recycle old *dBASE* records.

### USER-TO-USER

Customize *DISKCOPY* to make quick multiple copies of disks.

### PC TUTOR

A QuickBASIC screen dump that prints EGA graphics displays



## ■ PC LAB NOTES

ing the /R switch to your SORT directive.

Both FIND and SORT have two additional useful features when used in conjunction with DIR. For one thing, they can be combined—with each other and with themselves—on the same command line, so long as you do not exceed the 127-character DOS input buffer. Thus, for example, if you wanted a listing of the files only (no subdirectories) in your root directory, sorted first by extension and then alphabetically by filename, you could enter

```
DIR | FIND/V *.* | SORT/+10 | SORT
```

and the results will shortly appear on your screen.

The other handy thing about using the DOS filters with DIR is that you can redirect the output either to a printer or to a file simply by adding

```
>PRN
```

or

```
>filename
```

at the end of the command string. And, incidentally, while I've separated the various parts of the command strings shown above by putting a space between the logical groups, if you're worried about the 127-character limit, you can omit the spaces. DOS wasn't taught to read by Evelyn Wood.

**WHAT'S DOT AGAIN?** The dot and double-dot entries that appear every time you do a DIR of a subdirectory are often puzzling even to long-time DOS users. The single dot followed by <DIR> is obviously used by DOS for the filename of the subdirectory itself, but of what use is it to us? The answer is that it saves at least two keystrokes. If you're in a subdirectory and want to copy its entire contents, you can use

```
COPY .
```

instead of

```
COPY *.*
```

The same goes for deleting.

While the single dot is of limited usefulness, the double dot—which to DOS signifies the parent of the current subdirectory—is a little handier. Typing long strings

of pathnames can easily get to be a nuisance, and if you're in

```
\PROG\INV\OLD\VERYOLD
```

and want to get back a level, it's a lot easier to type

```
CD ..
```

than it is to enter

```
CD \PROG\INV\OLD
```

Further, from any directory except the root, typing

```
DIR ..
```

will get you a listing of the files in the parent directory.

**TOO MANY DIRECTORIES** As disks and subdirectories begin to accumulate, however, outmoded and duplicate files proliferate. But how do you know which files to trash? If you've got a stack of diskettes with little or no idea what's on each one, the time-honored solution is to crank up your printer and enter

```
DIR A: > PRN
```

Since the F3 key in DOS automatically re-types the previously entered command for you, all you have to do is keep hitting F3 and Enter as quickly as you change the disks in drive A:.

**COMPARING DIRECTORIES** The ultimate limitation of DIR, of course, is that it lets you see only one directory at a time. Wouldn't it be nice to be able to compare two directories from different disks or subdirectories on the same screen, and to scroll each directory individually or together as one? SCANDIR.COM lets you do just that.

As explained in the accompanying sidebar "Downloading SCANDIR and DIRCOMP," the easiest way to obtain a copy of SCANDIR.COM is by modem, using the free PC Magazine Interactive Reader Service. Alternatively, however, you can type in either the assembly language listing (if you have a Macro Assembler) shown in Figure 1, or you can type in and run the BASIC program that is shown in Figure 2. When you run the latter once (you don't need BASIC after that), it will automatically take care of producing a

```

; Scandir.com
; FORMAT: SCANDIR [directory] [directory]

CODE SEGMENT
ASSUME CS:CODE,DS:CODE
ORG 100H

START:  JMP  BEGINNING

;
; DATA AREA
;
; DOS_DIRECTIVE DB  "COMMAND.COM",0
; PARAMETER     DB  127,"/C DIR "
; DIR_PATH      DB  118 DUP(32)
; DIR_FILE      DB  "DIR.###",13

ENVIRONMENT
CWL_LINE_PTR    DB  0 OFFSET PARAMETER
STACK_SEG      DW  7
STACK_PTR       DW  7

PARAM_FLAG      DB  0
STATUS_SEG      DW  7
BUFFER_ADDR     DW  0 OFFSET BUFFER

DIR_OFFSET1     DW  2
DIR_OFFSET2     DW  2
CUR_OFFSET1     DW  7
CUR_OFFSET2     DW  7
LEFT            DB  1
RIGHT           DB  8

STATUS_LINE     DB  "000 '24,32,25,32,27,32,26,' PyOp PyDs Scroll Look "
ACTIVE          DB  "24,' Active '24,8 DUP(32),'Free Rec to Exit',7 DUP(32)
ERROR_MSG       DB  13,10,"COMMAND.COM must be in drive A:!"
                DB  "Copyright 1986 Cliff Davis Publishing Co.,LAX"
                DB  "Michael J. Ruffolo"

;-----
; Some housekeeping first. Free up excess memory allocated to us. We then
; can load COMMAND.COM and let it do the work of getting the directories.
;
;-----

```

(continues)

Figure 1: The assembly language program for SCANDIR.COM.

```

; Also, zero out the buffer where the directories will be stored.
;-----
;
; CODE AREA
;
BEGINNING:
MOV SI,1000H ;Request 4096 paragraphs (4K) for us
MOV AX,40AH ; and return the rest to the pool
INT 21H ; to load COMMAND.COM

SEND_BUFFER:
MOV DI,OFFSET BUFFER ;Put zeros in the 40,000 byte directory
MOV CX,3000H ; buffer at the end of our code. This
MOV AX,AX ; will eliminate the garbage that would
CLD ; be displayed at the end of directory.
REP STOSB

;-----
; This routine will parse the parameters of the command line.
;-----
PARSE:
MOV SI,01H ;Point to first character in parameters
MOV BP,2 ; and a count of two possible char.
NEXT_PARA:
MOV DI,OFFSET DIR_PATH ;Point to parameter storage.
GET_PARA:
LODSB ;Get a character.
CMP AL,13 ;If it's carriage return, then end of
JNE SPACE ; of parameters.
CMP PARA_FLAG,1 ;If parameter flag is high, we have
JNE DONE_HERE1 ; already written directory, else do so
CALL WRITE_DIR ; now and then we are ready to display.
JMP DISPLAY
DONE_HERE1:
MOV AX,12 ;
JNE GET_PARA ; If there is more than one space
; between parameters, get next char.

STORE_CHAR:
STOSB ;Store the character
LODSB ; and get another.
CMP AL,13 ; If it's carriage return, it is the
JNE DONE_HERE2 ; the end of parameters.
CMP AL,12 ; If it's space, it's the end of this
JNE STORE_CHAR ; parameter, otherwise store the char.
JNE STORE_CHAR ; Save pointers.
PUSH DI
CALL WRITE_DIR ;Write the directory and on return, see
POP DI ; Restore pointers.
POP BP
DEC BP ; If this is second parameter.
JNE NEXT_PARA ; If so, get next parameter, else we are
JMP END_DISPLAY ; ready to display.
DONE_HERE2:
CALL WRITE_DIR

;-----
; More housekeeping. We will be writing directly to the screen buffer ;
; so we need the display card address and the status register. ;
; Turn off the cursor; it is not needed and would be distracting. ;
; Also, clear the screen with the current attribute. This will please ;
; those who have a customized color screen. ;
;-----
DISPLAY:
MOV AX,40B ;Point to the ROM BIOS data area ;
MOV DX,AX ; and get base address of active ;
MOV AL,06H ; display card.
ADD AX,10 ; Add six to get status register ;
PUSH CX ; Done there, so restore data segment.
POP DX
MOV STATUS_REG,AX ;Store status register.
ASSUME THAT IT IS THE ROM CARD.
CMP AX,30AH ;Status port of ROM card is 30Ah.
JNE MONO ; If that's what we got, it's MONO ;
ADD EDI,0000H ; else COLOR so add 0000h.
SUB BX,0000H

MOV CX,2000H ;Turn off the cursor.
MOV AH,1
INT 19H
CALL CLS ;Clear the screen.

;-----
; Now, we are ready to initialize the screen ;
; with the two directories and status line. ;
;-----
MOV AX,3 ;Set counter to three.
MOV SI,OFFSET BUFFER ;Point to buffer.
MOV DI,0 ;Point to top left of screen.
CALL WRITE_LINE ;We're set up, so write to screen.
CMP BYTE PTR [SI],32 ;Is directory more than one line?
JNE STORE_OFFSET ; If no, store pointer
ADD SI,32 ; else adjust by one line.
;SI now points to first line of
MOV CX,OFFSET SI ; directory; save.
MOV AX,25 ;Set counter to first 25 lines
CALL WRITE_LINE ; and display.

MOV AX,3
MOV SI,OFFSET BUFFER+3000H ;Do the same for the
MOV DI,0 ; second directory.
CALL WRITE_LINE

```

(Figure 1 continues)

## DOWNLOADING SCANDIR AND DIRCOMP

The programs that appear in *PC Magazine* (as well as other programs we publish) can be downloaded by modem from the PC Magazine Interactive Reader Service. There is no charge for this service, but users are cautioned that these programs are copyrighted material and are made available only for individual, noncommercial use. Making copies for others (including placement on other electronic bulletin boards), with or without charge, is a direct violation of the Ziff-Davis copyright.

The modem number for PC-IRS is (212) 696-0360. Set your modem and communications software to use 1,200 (or 300) bps, 8 data bits, 1 stop bit, no parity. PC-IRS files with a .COM, .EXE, or .ARC extension require that you also use the Xmodem error-checking protocol; our other files (e.g., with extensions of .ASM or .BAS) can be downloaded using either regular ASCII or Xmodem transmission.

SCANDIR.BAS and DIRCOMP.BAS, whether typed in from the magazine at your keyboard or downloaded from PC-IRS, will automatically create SCANDIR.COM and DIRCOMP.COM, respectively, when run once in BASIC. Similarly, the two assembly language listings, SCANDIR.ASM and DIRCOMP.ASM, also listed both here and on PC-IRS, allow you to modify the program but require the use of a macro assembler (you can use either IBM or Microsoft versions), with the commands

```

MASM SCANDIR;
LINK SCANDIR;
EXE2BIN SCANDIR SCANDIR.COM

```

OF

```

MASM DIRCOMP;
LINK DIRCOMP;
EXE2BIN DIRCOMP DIRCOMP.COM

```

## ■ PC LAB NOTES

## SCANDIR AND DIRCOMP AT A GLANCE

The syntax for the two commands is the same:

```
SCANDIR filespec1 filespec2
DIRCOMP filespec1 filespec2
```

where *filespec* may incorporate a drive and directory path. Because it loads a secondary command processor, SCANDIR.COM requires that a copy of COMMAND.COM be on the boot-up drive (floppy or hard disk).

Operation: SCANDIR.COM provides on-screen directions for using the cursor keys, PgUp and PgDown keys, and the ScrollLock key to move the two directory windows up and down independently or together. DIRCOMP automatically alphabetizes its directory listings so that any two identical filenames appear on the same line. DIRCOMP also permits its listings to be redirected to a printer or a file.

copy of SCANDIR.COM for you.

Once you have a copy, at the DOS prompt simply enter

```
SCANDIR [directory] [directory]
```

If you do not give SCANDIR a specific directory, it will display the current directory. If you do want a directory other than the default, you can specify either one or two directories on the command line. (If you're working on an all-floppy-disk machine, you do need to make sure that there is a copy of COMMAND.COM on the disk in drive A:.) The requested directories will then appear side by side on the screen.

You can use the Up and Down Arrow keys to scroll line by line through the directory. The PgUp and PgDn keys will scroll a page at a time. Use the Left and Right Arrow keys to toggle between windows; the status line at the bottom of the screen indicates the current active window. The ScrollLock key will lock the directories together. When you scroll the directory off

```

CRP     R7E PTR [R11,32]
JNE     STORE_OFFSET2
ADD     SI,39
STORE_OFFSET2: MOV  DIR_OFFSET2,SI
          MOV  CUR_OFFSET2,SI
          MOV  AP,28
          CALL WRITE_LINE

          MOV  AR,2
          MOV  SI,OFFSET STATUS_LINE          ;And the same for the
          MOV  DI,168+24                      ;status line.
          CALL WRITE_SCREEN
          MOV  SI,62
          DEC  AP
          JNE  NEXT_STAT

;-----
; We are ready for business now. We will
; loop here, waiting for user keystrokes.
;-----

GET_KEY: MOV  AR,2                          ;Get the current shift status.
          INT  16H
          TEST A2,168
          JS   NOT_SCROLL
          MOV  AR,24
          MOV  ACTIVE,AR
          MOV  ACTIVE+9,AR
          JNE  SHOW_STATUS                  ; and display.

NOT_SCROLL: MOV  AR,24
          INT  16H
          JS   ON_LEFT
          MOV  AR,32
          MOV  ACTIVE,AR
          MOV  AR,24
          CRP     RIGHT,1
          JS   ON_RIGHT
          MOV  AR,32
          MOV  ACTIVE+9,AR

ON_LEFT:  MOV  SI,OFFSET ACTIVE
          MOV  DI,24*168+78
          CALL WRITE_SCREEN

          MOV  AR,1
          INT  16H
          JS   GET_KEY
          MOV  AR,8
          INT  16H

ON_RIGHT: MOV  AR,1
          CRP     UP_ARROW
          MOV  DI,OFFSET DIR_FILE+1
          MOV  R7E PTR[DIR_FILE+8],8
          MOV  AR,41H
          INT  21H
          CALL CLS
          MOV  CX,687H
          MOV  AR,1
          INT  16H
          INT  28H
          ; and exit.

UP_ARROW: CRP     AR,48H
          JNE  DN_ARROW
          MOV  RP,39
          CALL SCROLL

DN_ARROW: CRP     AR,50H
          JNE  PG_UP
          MOV  RP,39
          CALL SCROLL

PG_UP:    CRP     AR,49H
          JNE  PG_DN
          MOV  RP,39*28
          CALL SCROLL

PG_DN:    CRP     AR,51H
          JNE  LP_ARROW
          MOV  RP,39*28
          CALL SCROLL

LP_ARROW: CRP     AR,48H
          JNE  RT_ARROW
          AND  RIGHT,0
          OR   LEFT,1
          ; If LEFT ARROW,
          ; turn right off
          ; and left on.

RT_ARROW: CRP     AR,48H
          JNE  NEXT_KEY
          AND  LEFT,0
          OR   RIGHT,1
          ; If RIGHT ARROW,
          ; turn left off
          ; and right on.

NEXT_KEY: JNE  GET_KEY

```

(Figure 1 continues)

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1-emulator AT w/256K	45
1-emulator PC w/ Qk	24
1-emulator AT w/256K	25
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270  
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## NEG

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1 liter 10 (10 ppm)

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Printer 110 (160 cps)		40
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15x100 15" (290 cps)		46
15x100 15" (290 cps)		47
15x100 15" (290 cps)		48
15x100 15" (290 cps)		49
15x100 15" (290 cps)		50
15x100 15" (290 cps)		51
15x100 15" (290 cps)		52
15x100 15" (290 cps)		53
15x100 15" (290 cps)		54
15x100 15" (290 cps)		55
15x100 15" (290 cps)		56
15x100 15" (290 cps)		57
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15x100 15" (290 cps)		59
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15x100 15" (290 cps)		62
15x100 15" (290 cps)		63
15x100 15" (290 cps)		64
15x100 15" (290 cps)		65
15x100 15" (290 cps)		66
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15x100 15" (290 cps)		75
15x100 15" (290 cps)		76
15x100 15" (290 cps)		77
15x100 15" (290 cps)		78
15x100 15" (290 cps)		79
15x100 15" (290 cps)		80
15x100 15" (290 cps)		81
15x100 15" (290 cps)		82
15x100 15" (290 cps)		83
15x100 15" (290 cps)		84
15x100 15" (290 cps)		85
15x100 15" (290 cps)		86
15x100 15" (290 cps)		87
15x100 15" (290 cps)		88
15x100 15" (290 cps)		89
15x100 15" (290 cps)		90
15x100 15" (290 cps)		91
15x100 15" (290 cps)		92
15x100 15" (290 cps)		93
15x100 15" (290 cps)		94
15x100 15" (290 cps)		95
15x100 15" (290 cps)		96
15x100 15" (290 cps)		97
15x100 15" (290 cps)		98
15x100 15" (290 cps)		99
15x100 15" (290 cps)		100

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## PRODUCTIVITY

## ■ PC LAB NOTES

```

MOV SI,CUR_OFFSET1      ;also, get current offset
ADD SI,SP                ;add keyboard response.
CMP SI,DIA_OFFSET1       ;is it below starting position?
JA UPPER_LIMIT1         ;if yes, check upper limit
MOV SI,DIA_OFFSET1       ;also set to starting position.
CBP BYTE PTR [SI],0      ;is it one of the zero bytes at
JA OK1                  ;we stored in the buffer?
MOV SI,DIA_OFFSET1       ;if yes, set to starting position
MOV CUR_OFFSET1,SI       ;and the same with current.
MOV CX,400              ;point to directory display line.
MOV AX,CX                ;A count of 20 lines
CALL WRITE_LINE          ;and display.
CMP ESI,RETURN           ;
MOV SI,CUR_OFFSET2       ;Do the same for the right side.
ADD SI,SP
CMP SI,DIA_OFFSET2
JA UPPER_LIMIT2
MOV SI,DIA_OFFSET2
CBP BYTE PTR [SI],0
JA OK2
MOV SI,CUR_OFFSET2
MOV CX,562
MOV AX,CX
MOV AX,20
CALL WRITE_LINE
RETURN RET

;-----
; This subroutine will display the requested lines.
;-----
WRITE_LINE: CALL WRITE_SCREEN ;Display.
DEC AX
JNE WRITE_LINE ;Do all lines.
RET ;Return.

;-----
; This subroutine displays the directory by writing directly
; to the screen buffer. To avoid screen noise (now) on the
; color card, the horizontal retace has to be monitored.
;-----
WRITE_SCREEN: MOV CX,STATUS_REG ;Get status register.
GET_LINE: MOV CX,39 ;Get count to 39 characters.
NEXT_BYTE: LODSB ;Get a byte.
MOV BL,AL ;Save it in BL.
IN AL,CX ;Get status.
TEST AL,1 ;Is it low?
JNE WAIT ;If not, wait until it is.
CLI ;No more interrupts.
HALT: IN AL,CX ;Get status.
TEST AL,1 ;Is it high?
JNE WAIT ;If no, wait until it is.
;Retrieve characters now it's OK
; to write to screen buffer.
;Interrupts back on.
INC NEXT_BYTE ;Bump pointer past attribute.
ADD DI,2 ;Get next byte.
RET ;Point to next line.
;Return

;-----
; This subroutine gets the current attribute
; and clears the screen with that attribute.
;-----
CLE: XOR BH,BH ;Get current attribute
MOV AH,0 ;of display page zero.
INT 10H
MOV AL,25 ;Scroll all 25 lines.
MOV CX,0 ;From upper left
MOV DI,1040H ;to lower right.
MOV SI,AX ;Attribute to BH.
MOV AH,6
INT 10H
RET ;Return.

;-----
; This subroutine displays the message.
;-----
DISP_STRING: MOV AH,9 ;Display a string.
INT 21H
RET ;Return.

;-----
;-----
;-----
BUFFER:
CODE ENDS
END START

```

(Figure 1 ends)

```

100 ' Program for creating SCANDIR.COM
101 CLS:PRINT "Checking DATA; please wait..."
102 FOR B=1 TO 65:FOR C=1 TO 17:READ A$:IF C<17 THEN 140
103 B=B+VAL(A$)
104 NEXT:NEXT
105 IF #92396 THEN RESTORE:GOTO 100
106 PRINT "ERROR: CHECK THE LAST NUMBER IN"
107 PRINT "EACH DATA STATEMENT--TWO REDO'S"END
108 FOR B=1 TO 65:FOR C=1 TO 16:READ A$:TTL=TTL+VAL("B"+A$)
109 NEXT
200 READ S:IF S=TTL THEN 220
210 PRINT "DATA ERROR IN LINE";B*16+260; " -- REDO":END
220 TTL=0:NEXT:RESTORE
230 OPEN "SCANDIR.COM" AS #1 LEN=1:FIELD #1,1 AS D$
240 FOR B=1 TO 65:FOR C=1 TO 16:READ A$
250 LSET D$=CHR$(VAL("B"+A$)):PUT #1:NEXT:READ DUMMYS:NEXT
260 CLOSE:PRINT "SCANDIR.COM CREATED"
270 DATA 09,50,01,43,6F,78,79,72,69,67,60,74,20,31,39,30,1461
280 DATA 36,20,5A,69,66,66,20,44,61,76,69,73,20,50,75,62,1347
290 DATA 6C,69,73,60,69,66,67,20,43,6F,2E,1A,4D,65,63,60,1417
300 DATA 61,65,6C,20,4A,20,20,4D,65,66,66,67,72,64,5C,43,1356
310 DATA 4F,4D,4D,41,65,44,20,43,4F,4D,80,7F,2F,43,20,44,1054
320 DATA 49,52,20,20,20,20,20,20,20,20,20,20,20,20,20,20,603
330 DATA 20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,512
340 DATA 20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,512
350 DATA 20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,512
360 DATA 20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,512
370 DATA 20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,512
380 DATA 20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,512
390 DATA 20,30,49,52,20,24,24,24,80,00,40,00,00,00,00,00,568
400 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,18
410 DATA 00,01,00,55,73,65,20,00,20,19,20,10,20,1A,20,50,644
420 DATA 67,50,70,20,50,67,44,62,20,53,63,72,6F,6C,6C,20,1306
430 DATA 6C,6F,63,60,20,10,20,41,63,74,69,76,65,20,10,1173
440 DATA 20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,20,914
450 DATA 73,63,20,74,6F,20,45,70,69,74,20,20,20,20,20,20,1107
460 DATA 20,00,0A,43,4F,4D,4D,41,65,44,20,43,4F,4D,20,6D,976
470 DATA 75,73,74,20,62,65,20,69,60,20,74,10,3C,20,75,76,56,57,1617
480 DATA 41,3A,24,00,00,10,0A,0A,CD,21,0F,00,00,00,00,00,00,1433
490 DATA 33,20,3C,00,00,00,00,00,00,00,00,00,00,00,00,00,53
500 DATA 0D,75,0D,00,3E,04,01,01,74,03,00,49,01,00,1E,50,1301
510 DATA 3C,20,74,2A,AA,AC,3C,0D,74,10,3C,20,75,76,56,57,1617
520 DATA 00,33,01,5F,5B,0D,73,03,00,00,00,00,00,00,00,00,1630
530 DATA 00,00,41,63,00,00,00,00,00,00,00,00,00,00,00,00,1414
540 DATA 3D,0A,03,74,04,01,03,00,00,00,00,00,00,00,00,00,1437
550 DATA 00,00,00,02,04,03,00,00,00,00,00,00,00,00,00,00,1591
560 DATA 00,3C,20,75,03,00,00,27,00,00,00,00,00,00,00,00,1530
570 DATA 04,14,00,00,01,04,03,00,00,00,00,00,00,00,00,00,1944
580 DATA 00,3C,20,75,03,00,00,27,00,00,00,00,00,00,00,00,1534
590 DATA 04,14,00,00,01,04,03,00,00,00,00,00,00,00,00,00,1865
600 DATA 03,0F,52,0F,CC,75,76,0A,02,CD,16,10,74,0C,04,2174
610 DATA 10,00,26,06,02,00,26,07,00,00,10,04,10,00,30,01,1201
620 DATA 01,01,74,02,04,20,00,26,06,02,04,10,00,30,02,01,1135
630 DATA 01,74,02,04,20,00,26,06,02,06,02,06,02,06,02,06,1220
640 DATA 01,01,04,01,CD,16,74,0F,04,00,CD,16,00,00,01,75,1750
650 DATA 10,0A,02,01,0C,06,00,01,00,04,01,CD,21,00,00,00,1650
660 DATA 09,07,06,04,01,CD,16,CD,20,00,00,00,00,00,00,00,1010
670 DATA FF,00,EE,00,00,00,50,75,06,0D,00,27,00,00,00,00,2123
680 DATA FC,09,75,06,0D,04,FC,00,00,00,00,00,00,00,00,00,2354
690 DATA 0C,03,00,00,00,00,FC,40,75,0A,00,26,02,00,00,00,1555
700 DATA 00,01,01,00,00,00,00,75,0A,00,26,02,00,00,00,00,1359
710 DATA 00,01,01,00,01,77,00,00,00,00,00,00,00,00,00,00,1701
720 DATA 01,0C,10,00,01,10,06,55,FA,20,0C,16,00,01,2E,00,1349
730 DATA 26,02,01,00,00,00,00,00,00,21,FA,20,00,26,02,01,20,1727
740 DATA 0E,16,00,01,00,5D,07,17,73,09,0A,31,02,04,00,00,1310
750 DATA 21,CD,20,00,00,00,00,00,00,00,00,00,00,00,00,00,1542
760 DATA 00,00,00,16,07,00,00,00,00,00,00,00,00,00,00,00,1332
770 DATA 02,00,30,75,04,3F,CD,21,01,06,07,01,30,75,2D,02,1390
780 DATA 00,00,00,04,00,00,00,00,00,00,00,00,00,00,00,00,1746
790 DATA 00,AC,3C,0D,74,06,0A,43,02,77,00,00,00,00,00,00,1930
800 DATA 4E,00,3C,0D,75,06,03,06,02,03,0C,02,30,DA,72,00,1674
810 DATA 00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1306
820 DATA AA,00,00,00,00,02,10,75,25,00,3C,0D,00,00,00,00,1463
830 DATA 36,0D,01,77,04,00,00,00,00,00,00,00,00,00,00,00,1310
840 DATA 00,01,00,36,0D,01,0F,00,01,04,10,20,00,00,00,00,1714
850 DATA 00,02,10,75,25,00,36,0D,00,00,00,00,00,00,00,00,1732
860 DATA 04,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1332
870 DATA 0F,01,0F,3C,02,04,10,00,01,00,00,00,00,00,00,00,1790
880 DATA 75,79,03,00,16,00,01,00,00,00,00,00,00,00,00,00,2091
890 DATA 75,79,FA,00,00,01,74,0F,0A,03,00,00,00,00,00,00,2007
900 DATA 07,52,03,32,FF,04,00,CD,10,00,19,00,00,00,00,00,2081
910 DATA 19,0A,00,00,00,00,00,00,00,00,00,00,00,00,00,00,1630

```

Figure 2: SCANDIR.BAS will convert itself to SCANDIR.COM when you run it.

the screen, it will reappear at the beginning. When you are done, press Esc.

Since I wanted to keep the familiar DOS directory display format anyway, rather than writing a lot of new code, I let a secondary copy of COMMAND.COM redirect a directory listing to a temporary file called DIR.555. The command looks like this:

```
COMMAND.COM/C >DIR.555
```

If you are reviewing the default directory, the DIR.555 file will show up at the end of the listing. Don't worry, when you press Esc to exit, SCANDIR will delete this temporary file as long as you have not changed diskettes in the default drive. If your default drive is full, there will not be enough room to write this temporary file, so you'll have to remove a file if you want to use SCANDIR. Further, SCANDIR

■ SCANDIR scrolls the screen by filling it with blanks that use the current attribute. This will please those with a customized color screen.

must be able to find COMMAND.COM on the drive that you booted from: if it does not, you will be returned to the DOS prompt. Hard disk users will not find this a problem, but if you have a floppy drive system, you do have to remember to have either your boot disk or one with COMMAND.COM on it in drive A:.

Unlike programs that clear the screen by calling INT 10 and changing modes, SCANDIR scrolls the screen by filling it with blanks that use the current attribute. This will please those who have a customized color screen. SCANDIR does not call on the DOS calls COMMAND.COM uses to display a directory but writes directly to the screen buffer. This gives you lightning-fast access to any page of your directory. For the technically curious who want

## ■ PC LAB NOTES

## DIRECTORIES ON DISK

DOS keeps the information of the directory on the first few tracks of a disk. On a double-sided diskette, this information can be found on the fifth logical sector. Thirty-two bytes are reserved for every directory entry, as shown in Figure A. The first byte of the filename will contain E5h if the entry has been erased. If you have used the Unerase feature of *The Norton Utilities*, this is the byte you are asked to replace.

The first byte after the filename (byte 0Bh) is the attribute of the entry. This byte, among other things (see Figure B), tells DOS if the entry should be included in directory listings.

You will recognize all the rest of the information as the same that appears in the directory listing, except for the starting cluster number. This word tells DOS just that, where to find the first cluster of the file. It's the FAT's (file allocation table's) job to keep track of the location of the rest of the file's clusters on the disk. For a discussion of how the FAT operates, see Steve Holzner's discussion in the Programming/Utilities column of our last issue (Volume 6 Number 1).

You can observe directory listings the way DOS does by using DEBUG. If you have never used DEBUG or have any hesitation, have no fear. The only command that has the potential to do damage is the W (write) command. Just remember not to enter W while in DEBUG and you can experiment without doing harm. The other DEBUG command to remember is Q for quit. This will exit and return you safely back to the DOS command.

So we can all stay together, put your DOS Supplemental Disk in drive A: and enter

DEBUG

Then place a copy (just to be on the safe side) of your primary DOS System Disk in A: and from DEBUG's hyphen prompt enter

L 100 5 5 7

This is telling DEBUG to Load at off-

set 100 from drive 0 (A), sector 5 through sector 0Bh (seven sectors). This is where the directory entries are kept on a double-sided diskette. Then enter

d

and you should see the directory that was loaded from the disk in drive A:. The first two entries will be the system files IBMBIO.COM and IBMDOS.COM. You'll note that the attribute of these two files is 27h. This tells DOS that these

files are read-only, hidden, and system and have not been backed up via the hard disk BACKUP utility.

Repeat the D (dump) command to see more entries. When you've had enough, enter Q to return to the DOS prompt. You might try the same thing with a data disk on which you have erased some files and observe that DOS has placed E5h as the first byte in the filename. Similarly, other attributes will show up, based on the listing of Figure B.—Michael J. Mefford

Disk Directory Entry																	
0	1	2	3	4	5	6	7										
F	I	L	E	N	A	M	E										
8	9	A	B	C	D	E	F										
Filename extension				File attribute		R		X									
10	11	12	13	14	15	16	17										
E				R		V		E		D		Time of creation or last update					
18	19	1A	1B	1C	1D	1E	1F										
Date of creation or last update				Starting cluster number				File size									
								Low word				High word					
								Low byte				High byte					

Figure A: Each 32-byte directory entry on a disk is arranged in this format.

File attributes	
#1h	Indicates that the file is marked read-only. This value can be used with other values below.
#2h	Indicates a hidden file. The file is excluded from normal directory searches.
#4h	Indicates a system file. The file is excluded from normal directory searches.
#8h	Indicates that the entry contains the volume label in the first 11 bytes. The entry contains no other usable information and may exist only in the root directory.
#10h	Indicates that the entry defines a subdirectory.
#20h	Indicates an archive bit. The bit is set on whenever the file has been written to and cleared. It is used by the BACKUP and RESTORE commands for determining whether the file was changed since it was last backed up. This bit can be used along with other attribute bits.

Figure B: An explanation of the values in the file attribute byte. To DOS, of course, these hexadecimal numbers appear as binary 1s (bit set) and 0s (bit reset, or off).

```

; DIRCOMP.ASM -- Lists two directorise side by side
; =====
ORG Segment
Assume CS:CSSEG, DS:DSSEG, SS:SSSEG, ES:ESSEG
Parameter Label Byte ; Parameter is here
Entry: Brg 0100h ; Entry Point
; =====
; Most Data (some more at end of program)
; =====
db "Copyright 1986 Riff-Davis Publishing Co.",1Ah
db " Programmed by Charles Petzold ",1Ah
db "Syntax: DIRCOMP filespec1 filespec2"
db "DIRCOMP: Needs DOS 2.0 or higher"
db "DIRCOMP: Bad file names"
db "DIRCOMP: Too many files"
db "DIRCOMP: Not enough memory"
db " ",1Ah
db " ",1Ah ; Storage of found files
db " ",1Ah
db " ",1Ah ; Count of found files
db " ",1Ah
db " ",1Ah
Append db " ",1Ah, " ",1Ah, " ",1Ah

; Check DOS Version
; =====
Begin: Mov AH, 30h ; Check for DOS Version
Int 21h ; through DOS call
Cmp AL, 2 ; See if it's 2.0 or above
Jae DoeVersOK ; If so, continue
Mov DX, Offset DoeVersMsg ; Error message

ErrorExit: Mov AH, 9 ; Print String function call
Int 21h ; Do it
Int 20h ; And exit prematurely

; Parse Command Line to get file specifications
; =====
DoeVersOK: Cld ; Direction forward
Mov SI, Offset Parameter ; Parameter string
Lodsb ; String in stack pointer
Mov BL, AL ; Length of Parameter
Sub SI, SI ; Make SI the length
Word Ptr [SI + BX], 0020h ; Put blank at end

Mov DI, Offset Filespec1 ; Destination of first spec
Call GetFilespec ; Transfer it and file it up
Mov DI, Offset Filespec2 ; Destination of second spec
Call GetFilespec ; Transfer it and file it up

; De-Allocate rest of memory
; =====
Mov DX, Offset SeeAllocMsg ; Possible error message
Mov SP, Offset StackTop ; String in stack pointer
Mov SI, SP ; Also end of needed memory
Add SI, 15 ; Add 15 for truncation
Mov CL, 4 ; Shift 4 bits right
Shr SI, CL ; Change memory size
Mov AH, 4Ah ; through DOS
Int 21h ; Do it
Jc ErrorExit ; If problem, terminate

; Find Files from file specification
; =====
Mov DX, Offset DTABuffer ; Set File Find buffer
Mov AH, 1Ah ; by calling DOS
Int 21h

Mov DX, Offset Filespec1 ; First file specification
Call GetFilesAndSort ; Do as it says
Mov Word Ptr [FilesList1 + 2], AX ; Segment of file list
Mov [FilesCount1], CX ; Number of files

Mov DX, Offset Filespec2 ; Second file specification
Call GetFilesAndSort ; Do it again
Mov Word Ptr [FilesList2 + 2], AX ; Segment of file list
Mov [FilesCount2], CX ; Number of files

; Now Display List on Screen
; =====
DoeKnotBar: Lea SI, DisplayString ; Destination of display line
Mov AL, " " ; Do as it says
Cmp [FilesCount1], 0 ; See if any more left
Jz FirstColDone ; If so, first column is blank
; =====

```

Figure 3: The assembler listing for DIRCOMP.

to understand how SCANDIR works, the assembly listing in Figure 1 is thoroughly documented.—MJM

While Michael Mefford's SCANDIR is sexier than a talk with Dr. Ruth, contributing editor Charles Petzold's DIRCOMP also allows simultaneous display of two directories. DIRCOMP.COM embodies a much more conservative programming approach that many readers may prefer. Rather than choosing between them editorially, we decided to let you try both and make your own selection.—Ed.]

**DOUBLE UP WITH DIRCOMP** Diskette and hard disk housekeeping requires that you periodically do some cleaning up. Often duplicate versions of the same file may be stored in several different subdirectories. Or, you may have diskettes

■ DIRCOMP "compares" two diskettes or sub-directories by listing the files in each in a two-column alphabetized format.

and subdirectories that contain many of the same files except for one or two different versions.

One utility that may come in handy for this housekeeping is DIRCOMP. DIRCOMP "compares" two diskettes or subdirectories by listing the files in each in a two-column alphabetized format. Each column is similar to a DIR listing, with the filenames, sizes, and date and time of creation or last change.

DIRCOMP uses the syntax

DIRCOMP filespec1 filespec2

where filespec1 and filespec2 are two file specifications with optional drives and directory paths. Generally, filespec1 and filespec2 will denote two different disk drives:

## ■ PC LAB NOTES

DIRCOMP A: B:

or two different subdirectories:

DIRCOMP \PROG\OLD \PROG\NEW

If a filename in the first and second group match exactly, the two files are shown side by side in the list. Otherwise, the file is shown on a line by itself. For those files listed side by side, you can look at the two file sizes and creation dates to see if they appear to be different files with the same filename. (For absolute confirmation, you'd have to run COMP. DIRCOMP does not do a byte-by-byte comparison of the contents of the files.)

You can get the executable DIRCOMP.COM by modem from PC-IRS, as explained in the sidebar, by calling the PC Magazine Interactive Reader Service with your modem at (212) 696-0360.

■ For those files listed side by side, you can look at the two file sizes and creation dates to see if they appear to be different files.

If you have an IBM or Microsoft assembler, you can download DIRCOMP.ASM or type in the listing in Figure 3 and assemble it yourself. (Note: I've assembled DIRCOMP under IBM's assemblers versions 1 and 2, and Microsoft's versions 3 and 4. It assembles fine under all of these except for IBM's MASM 1.0, which inexplicably crashes. If you have version 1 of IBM's assembler, use ASM instead.) Alternatively, you can download or type in DIRCOMP.BAS (Figure 4), load it into BASIC, and run it once to create DIRCOMP.COM.

**ON PLAYING BY THE RULES** DIRCOMP may be disappointing if you're accustomed to programs that pop onto the

```

Cmp      [FileCount2],#      ; See if second is done
ListOnly1: Jz                ; If so, 2nd column is blank
Push     SI
Push     CX
Push     BX
Push     SI
Lds      SI, [FileList2]      ; Address of second list
Lds      DI, [FileList1]      ; Address of first list
Mov      CX, 12              ; Number of bytes to compare
Repz     Scmpb                ; Compare them
Pop       SI                  ; Get back registers
Pop       SI
Pop       SI
Jb       ListOnly1            ; If file 1 < file 2, list 1
Jz       ListOnly2            ; If file 1 = file 2, list 2
Jc       ListFile1            ; Put first in display string
Stosb    ; Put a blank after it
Jmp      DoSecond            ; Now do second file

FirstColDone: Cmp      [FileCount2], # ; See if second done also
Jz                ; If so, we're done
ListOnly2:  Mov      CX, 48      ; If not, store 48 blanks
Repz     Stosb

DoSecond:   Call     ListFile2      ; Put 2nd file in display str
Jmp      Short WriteCRLF           ; And append a CR/LF

ListOnly1:  Call     ListFile1      ; Put 1st file in display str
Mov      CX, 48                    ; Blank out second half
Repz     Stosb

WriteCRLF:  Mov      AX, 0A0Dh      ; Put CR/LF at end of string
Stosw

SpillOut:   Lds      DI, [DisplayString] ; Address of display string
Mov      CX, SI                    ; Number of characters
Mov      SI, 1                     ; Standard output
Mov      AX, 40h                   ; Write to screen
Int      21h                       ; through DOS
Jmp      DoAnother                 ; And do the next one

AllDone:    Int      21h            ; All done -- terminate

;----- SUBROUTINE: Get File Spec (uses DI to point to destination) -----
;
GetFileSpec: Mov      DX, DI          ; Save pointer in DX
Search:      Call     ScanParam       ; Check next byte
Jz          Search                  ; If delimiter, keep searching

SearchEnd:   Stosb                    ; Save the character
Call     ScanParam                  ; Check the next byte
Jnz      SearchEnd                  ; If not delimiter, continue
Mov      SI, 1 + Offset Append      ; Make it an ASCII string
Push     SI                          ; Save parameter pointer
Mov      CX, 4                      ; Set to " " string
Mov      DI, [DI - 1], ','           ; Possible 4 bytes to move
Cmp      [DI - 1], '\ '              ; Do it if last character is \
Jnz      AppendStuff                ; Or if last character is \
AppendStuff: Mov      AX, 4308h      ; Get file attribute
Jz          ; through DOS
Int      21h                         ; If error, do no more
Jc       ; If error, do no more
Test     CX, 10h                     ; See if it's directory
Jz          ; If not, do no more
Dec      SI                          ; If so, append "\"
Inc      CX                          ; which has five characters

AppendStuff: Rep       Movsb          ; Append string to file spec
FisDpDone:  Jz          ; And done with this stuff

;----- SUBROUTINE: Scan Parameter -----
;
ScanParam:   Push     DI              ; Save destination pointer
Lodsb       ; Get byte from parameter
Cmp      AL, 13                      ; See if end of parameter
Jz          ; If so, got an error
Mov      DX, Offset BytesMsg        ; Load up error message
Jmp      ErrorExit                  ; and exit

NotAtEnd:    Mov      DI, Offset Delimiter ; Check if delimiter
Mov      CX, 5                      ; There are 5 of them
Repz     Scasb                      ; Scan the string
Pop       DI                        ; Get back pointer
Ret                                     ; And return

;----- SUBROUTINE: Get Files and Sort -----
;

```

(Figure 3 continues)

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```
GetFilesAndSort: Push ES ; Try to allocate 64K memory
Nov RX, 1000h ; through DOS
Nov AH, 40h
Int 21h
Jnc AllocateOK ; If no error, we've got it
Nov AH, 40h ; Otherwise allocate
Int 21h ; as much as possible

AllocateOK: Nov CL, 4 ; Turn $8 into an offset
Sub $8, CL ; Take away 28 bytes
Nov ES, AX ; Set $8 to memory segment
Sub DI, DI ; Point to beginning
Sub $8, BP ; File Counter
Nov CX, $6h ; Normal, hidden, system files
Nov AH, 42h ; Find first file

FindFile: Int 21h ; Call DOS to find file
Jnc Continue ; If no error continue
Cmp AX, 18 ; If no more files
Jz NoMoreFiles ; get out of the loop
Nov DX, Offset FileSpecMsg ; Error message otherwise
Jmp ErrorExit ; Exit and print message

Continue: Cmp DI, $8 ; See if end of segment
Jb StillD8 ; If not, continue

TooManyFiles: Nov DX, Offset TooManyMsg ; Otherwise error message
Jmp ErrorExit ; And terminate

StillD8: Inc SP ; Pick up file counter
Nov SI, 16*Offset DTABuffer ; Point to filename
Nov CX, 12 ; 12 bytes to transfer

TransName: Lodsb ; Get a byte
Dec AL ; See if it's zero
Jz NameDone ; If so, transfer done
Cmp AL, '*' ; See if it's period
Jz NoMoreFiles ; If not keep going
Sub CX, 1 ; If period, adjust counter
Nov AL, ' ' ; Pad name with blanks
Rep Stosb ; Re-adjust counter
Add CX, 3 ; And continue
Jmp TransName ; If not period, just store it
; And keep going

NotPeriod: Stosb
Loop TransName

NameDone: Nov AL, ' ' ; Pad end of name with blanks
Rep Stosb ; Point to time/date/size
Nov SI, 22*Offset DTABuffer ; Save that stuff too
Rep $, 4
Nov AH, 40h ; Find next file
Jmp FindFile

NoMoreFiles: Nov $X, DI ; End of file storage
Add $X, 15 ; Convert to paragraph
Nov CL, 6
Shr $X, CL
Nov BU, 4Ah ; Re-adjust memory
Int 21h

; Sort Files
;
Push DS ; Save DS
Push ES ; Point DS to files
Pop DS ; This is the beginning
Sub DI, DI ; Number of files to sort
Nov CX, BP ; If no files, we're done
Jczt AllSorted ; Loop needs one less than CX
Dec Dec ; But zero means only one file
Jczt AllSorted

SortLoop1: Push CX ; Save the file counter
Nov SI, DI ; Set source to destination

SortLoop2: Add SI, 28 ; Set source to next file
Push CX ; Save the counter,
Push SI ; compare source,
Push DI ; and compare destination
Nov CX, 28 ; 28 characters to compare
Rep Cmpsb ; Do the compare
Jnz NoSwitch ; Jump if already in order
Pop DI ; Get back these registers
Pop SI
Push SI ; And push them again for move
Push DI ; 28 characters
Nov CX, 28 ; Character from destination
; Source to destination

SwitchLoop: Nov $S, DI] ;
```

(Figure 3 continues)

## ■ PC LAB NOTES

screen and use full-screen display manipulation. DIRCOMP uses simple teletype-like output similar to the regular DIR command. Although I toyed around with fancier approaches, I ultimately decided to make DIRCOMP as simple and straightforward as possible. This program uses only standard DOS calls with no trickery. Consequently, the internal workings of DIRCOMP are rather dull. But this simple and unflashy approach does have some distinct advantages:

First, readers' letters about some of my past Programming/Utilities columns have led me to a simple conclusion: the number of problems reported by readers is directly proportional to the degree of trickery and hardware dependence in the program. Fol-

■ Because DIRCOMP uses DOS for output, you can send output to somewhere other than the display.

lowing strict DOS rules guarantees that a program will run with a minimal number of problems.

Second, because DIRCOMP uses DOS for output, you can send output to somewhere other than the display by using DOS redirection of standard I/O. If you wanted to get the list on a printer, use

```
DIRCOMP SUBDIR1 SUBDIR2 >PRN
```

If you want it in a file for closer perusal by your word processor use

```
DIRCOMP SUBDIR1 SUBDIR2 >FILENAME
```

If you've rigged up a couple of PCs so you can control one PC from the other using the CTTY command, DIRCOMP will also work fine with that arrangement.

Third, DIRCOMP will probably run under any version of MS-DOS 2.0 or later. It does not require that the machine be an IBM compatible in terms of either hardware or BIOS support.

Fourth, DIRCOMP will easily run in a

```

Mov     DS:[SI - 1], AL      ; Character to source
Loop    SwitchLoop          ; For the rest of the line

NoSwitch:
Pop     DI                  ; Get back the registers
Pop     SI
Pop     CX
Loop    SortLoop2           ; And loop for next file
Pop     CX                  ; Get back file counter
Add     DI, 28              ; Compare with next file
Loop    SortLoop1           ; And loop again

AllSorted:
Pop     DS                  ; Get back to normal
Mov     AX, ES              ; File segment in AX
Pop     ES
Mov     CX, SP              ; File count in CX
Ret

; SUBROUTINES for listing files on screen
;
ListFile1:
Push    DS
Lds     SI, [FileList1]     ; Set to address of list
Call    ListFile            ; Put it into DisplayString
Pop     DS
Mov     Word Ptr [FileList1], SI ; Save new pointer
Dec     [FileCount1]        ; Decrement count

ListFile2:
Push    DS
Lds     SI, [FileList2]     ; Set to address of list
Call    ListFile            ; Put it into DisplayString
Pop     DS
Mov     Word Ptr [FileList2], SI ; Save new pointer
Dec     [FileCount2]        ; Decrement count

ListFile:
Push    AX
Push    SI
Push    DI
Mov     CX, 12              ; 12 characters in file name
Rep     Movsb               ; Transfer them
Mov     AL, ' '             ; Blank out the rest
Rep     Stosb
Rep

Sub     DI, 6                ; Point to time destination
Lodsb   ; Get the coded time

Mov     SI, $1Fh            ; AND mask for hours
Mov     SS, 'H'             ; Seco-blank indicator
Mov     CL, 11              ; Shift value for hours
Sub     DI, DI
Mov     DH, ' '             ; Following character
Call    DateTime            ; Do the transfer routine

Mov     SI, 3Fh             ; Zero DE / AND mask for minutes
Mov     CL, 5               ; Shift value of minutes
Mov     DH, ' '             ; Following character
Call    DateTime            ; Do the transfer routine

Sub     DI, 16              ; Point to date destination
Lodsb   ; Get the coded date

Mov     SI, $Fh             ; AND mask for month
Mov     SS, 'S'             ; Seco-blank indicator
Mov     CL, 5               ; Shift value for month
Mov     DH, ' '             ; Following character
Call    DateTime            ; Do the transfer routine

Mov     SI, 1Fh             ; Zero DE / AND mask for day
Mov     CL, 8               ; Shift value for day
Mov     DH, ' '             ; Following character
Call    DateTime            ; Do the transfer routine

Mov     SI, 7Fh             ; AND mask for year
Mov     CL, 9               ; Shift value for year
Mov     DH, 'Y'             ; Following character
Call    DateTime            ; Do the transfer routine

Sub     DI, 12              ; Point to end of file name space
Lodsb   ; Get low word
Mov     DX, AX              ; Save it in DX
Lodsb   ; AX is high word, DX low word
Mov     SI, 18              ; Will divide by 18 for ASCII
Stsb    ; Direction backward

AsciiLoop:
Mov     CX, DX              ; Save low word in CX
Mov     DX, DX              ; Zero out DX for division
Div     AX                  ; AX = quotient, DX = remainder
Xchgb   AX, CX              ; Now AX = low word, CX = quotient1
Div     DX                  ; AX = quotient2, DX = remainder
Xchgb   AX, DX              ; AX = remainder, DX = quotient2
Add     AL, '0'             ; Adjust for ASCII
Stosb    ; Store it

```

(Figure 3 continues)

```

Mov     AX, CX      ; See if zero is left
Or      CX, DX      ; If not, continue
Jnz     AsciiLoop   ; Get back to normal

Cld
Pop     DI
Pop     SI
Pop     AX
Add     SI, 28       ; Next file in list
Add     DI, 39       ; Next byte in destination
Ret

; ----- SUBROUTINE: Date and Time Display -----
;
DateTime: Push     AX
          Push     BX
          Push     CX
          Push     DX
          Shl      AX, CL      ; Shift word left by CL bits
          And     AL, BL      ; AND it with BL mask
          Add     AL, DL      ; Offset it by DL
          Sub     AH, AH       ; Zero out high byte
          Mov     BL, 10       ; Divide by 10
          Div     BL
          Add     AX, '00'     ; Convert to ASCII
          Cmp     AL, 09       ; Check zero-blank
          Jnz     LeadingZero  ; Put in blank instead of zero

LeadingZero: Stosw           ; Store the two bytes
            Mov     AL, 09
            Stosb           ; Store that also
            Pop     DX
            Pop     CX
            Pop     BX
            Pop     AX

; ----- Variable length data stored at end -----
;
FileSpec: Label     Byte
            equ     FileSpec + 88
            equ     FileSpec + 88
            equ     DTNuffer + 43
            equ     DisplayString + 81
            equ     EndOfData + 288h
            EndS
            End          ; End of the segment
                        ; Denotes entry point

```

(Figure 3 ends)

```

100 ' Program for creating DIRCOMP.COM
110 CLS:PRINT "Checking DATA; please wait..."
120 FOR B=1 TO 55
130 FOR C=1 TO 17
140 READ A$ IF C=17 THEN 160
150 I=88+VAL(A$)
160 NEXT C
170 IF I=91367 THEN RESTORE GOTO 200
180 PRINT "ERROR: CHECK THE LAST NUMBER IN"
190 PRINT "EACH DATA STATEMENT--THEN REDO":END
200 FOR B=1 TO 55
210 FOR C=1 TO 16
220 READ A$;TTL=TTL+VAL("AH"+A$)
230 NEXT
240 READ S:IF S=TTL THEN 270
250 PRINT "DATA ERROR IN LINE";B*10+330
260 PRINT "CHECK FIGURES AND REDO":END
270 TTL=0:RESTORE
280 OPEN "DIRCOMP.COM" AS #1 LEN=1:FIELD #1, A$ D$
290 FOR B=1 TO 55
300 FOR C=1 TO 16
310 READ A$:LEFT D$=CHR$(VAL("AH"+A$))
320 PUT #1;NEXT:ASAD DUNNY$;NEXT:CLOSE
330 PRINT "DIRCOMP.COM CREATED"
340 DATA 19,5C,00,43,6F,78,79,72,69,67,68,74,28,31,39,38,1616
350 DATA 26,28,5A,89,88,66,2D,44,61,76,69,73,28,58,75,62,1388
360 DATA 6C,69,73,68,69,68,67,28,43,6F,28,1A,28,58,72,6F,1369
370 DATA 67,72,61,6D,4D,65,64,28,62,79,28,43,68,61,72,6C,1586
380 DATA 85,73,28,58,65,74,7A,6F,6C,64,28,1A,53,79,6E,74,1474
390 DATA 61,78,3A,28,44,49,52,43,4F,4D,58,28,66,69,6C,65,1281
400 DATA 73,78,65,63,28,68,69,6C,65,73,78,65,63,24,44,49,1479
410 DATA 52,43,4F,4D,58,3A,28,4E,65,65,64,73,28,44,4F,23,1232
420 DATA 28,32,26,38,28,26,24,44,49,52,43,4F,4D,58,3A,28,983
430 DATA 42,61,72,28,46,49,6C,65,28,62,81,6D,65,24,44,49,1337
440 DATA 52,43,4F,4D,58,3A,28,54,6F,6F,28,6D,61,68,79,28,1282
450 DATA 66,69,6C,65,73,24,44,49,52,43,4F,4D,58,3A,28,46,1281

```

(Figure 4 continues)

window under a multitasking environment such as *TopView* or *Windows*. (The .PIF file should specify that DIRCOMP requires 32K and could use as much as 128K. It does not intercept any interrupt vectors, steal the keyboard, or write directly to the display.)

Fifth, since DIRCOMP performs no fancy tricks, I suspect (and hope) that it will be easier to port to a future version of DOS. About the only thing we really know about future multitasking versions of DOS is that proper and polite memory-allocation procedures will be very important. For this reason, DIRCOMP uses DOS calls to allocate blocks of memory rather than simply grabbing what's available. For each of

■ DIRCOMP will run in a window under a multitasking environment such as *TopView* or *Windows*.

the two directories, DIRCOMP first attempts to allocate 64K through the DOS function call 48h (Allocate Memory). If 64K is not available, the program takes the amount that is available. It uses 20 bytes of this block for each file it finds, so 64K allows over 3,000 files per directory. After DIRCOMP finishes storing the file information from each directory, it calls DOS again with function call 4Ah (Modify Allocated Memory Block) to free up the memory it doesn't need.

DIRCOMP itself must duplicate many of the same things that the DIR command does, but there are some differences. First, DIRCOMP is not quite as clever as DIR in dealing with global filenames using the \* and ? characters. DIRCOMP can properly deal with file specifications of the form

C:

or

C:\

or

C:\SUBDIR

Figure 4: A BASIC program that will produce DIRCOMP.COM.





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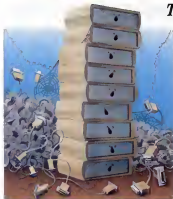
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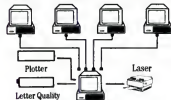
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## ■ PROGRAMMING/UTILITIES ■ MICHAEL J. MEFFORD

# A COMMAND YOU CAN COUNT ON



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Determining the number of characters, words, and sentences in a text file is sometimes necessary. When writing a letter to the editor, for example, you may be asked to keep your word count below 300. I painfully recall that teachers required reports to be just the opposite; that is, 500 words or more. And when you get involved with desktop publishing, column length is determined by the total number of printable characters. Or perhaps you're just curious about how many characters you average per word or how many words you average per sentence.

PARSE.COM will quickly do the counting for you and give you a full report. As a further refinement, PARSE will rate your document on its readability, based on a near approximation of the FOG index. Never heard of the FOG index? Well, neither had I until recently. I'll explain it in due course, but first let me tell you how to use PARSE. Its syntax is

PARSE [d:] [path] filename

The drive and/or path specifiers are optional; if omitted, the default drive and directory will be searched for your document. *Filename* can be any ASCII text file. That includes "high-bit" WordStar files. If your word processor prefixes your file with its own special control codes, however, you will get somewhat inaccurate results. WordStar dot commands or printer codes embedded in the text may also taint the count. All the same, you'll get a pretty good idea where you stand.

If the specified file is not found, no error message is displayed, and you will sim-

ply return to the DOS prompt. Otherwise, the file is opened and a maximum of 64,000 bytes are read into a buffer area. If the file is larger than this, additional 64,000-byte blocks are read after the cur-

rent buffer is parsed. When the end of file is reached, the count of printable characters, words, sentences, average characters per word, average words per sentence, and grade reading level are reported.

```

;
; Parse.com
; Returns character, word and sentence count
; count of ASCII files that is compiled into
; a reading level index.
; Syntax PARSE [d:] [path] filename
CODE SEGMENT
ASSUME CS:CODE, DS:CODE
ORG 100H

START:      JMP BEGINNING

;
; DATA AREA
;
NOTICE      DB      ' Copyright 1986 Siff-Davis Publishing Co.'
NOTICE_2    DB      ' Programmed by Michael J. Mefford'

CHAR_COUNT  DB      0
CHAR_CT_CARRY DB 0
WORDCHAR_CT DB 0
WORDCHAR_CARRY DB 0
WORD_COUNT  DB      0
SENTENCE_COUNT DB 0
LONG_WORDS  DB      0
INTEGER     DB      0
DECIMAL     DB      0

WORD_FLAG   DB      0
SENTENCE_FLAG DB 0
DISPLAY_FLAG DB 0

ALPHA_STRING DB ' printable characters.'
WORD_STRING  DB ' words.'
LONG_STRING  DB ' words with three or more syllables.'
SENT_STRING  DB ' sentences.'
EVS_STRING   DB ' avg. characters/word.'
LWS_STRING   DB ' avg. words/sentence.'
FOG_INDEX    DB '13,18,'
GRADE_LEVEL DB '13,18,'
DECIMAL_PT   DB ' '
CARRY_64K    DB '65536+'

;
; Before the file can be parsed, the command line has
; to be parsed. Then the file will be opened and read.
;
; BEGINNING:  MOV     DI,00H          ;Point to parameter.
;              MOV     SI,DI         ;Get parameter length.
;              XOR     BX,BX         ;Zero in high half.

```

Figure 1: The assembly language listing for PARSE.COM

## ■ PROGRAMMING/UTILITIES

**SERVING UP PARSE** As explained in the accompanying sidebar, you can download PARSE by modem from the PC Magazine Interactive Reader Service. If you prefer to key it in yourself, the assembly language listing is shown in Figure 1, and Figure 2 is a BASIC program that will create PARSE.COM for you directly.

The parsing is governed by the following set of grammatical rules. A character is any byte that is the ASCII space character or above—that is, any printable character. Words are distinguished by one or more characters delimited by a space or by a lower-numbered ASCII code. Other than a

## ■ PARSE.COM looks at each character of your file and implements grammatical rules.

space, this will usually be a carriage return. The character count for words is restricted to alphanumeric. The character count is divided by the word count to get the average number of characters per word. Sentences are recognized by either a period, question mark, or exclamation point followed by a delimiter (the space character or below). If a hyphen is embedded in a word or at the end of a line, the word is considered hyphenated and is counted as one word.

PARSE.COM looks at each character of your file and, after stripping the high bit by ANDing the character with binary 01111111 (hexadecimal 7F), implements the grammatical rules given above. This is not, of course, a complete set of rules intended to cover all possible combinations of the complicated English language, but it should suffice for most documents.

**LOST IN THE FOG** Whether or not your documents are read may depend on their complexity. Your word usage should be targeted toward the reading level of your audience. If too simple, you may bore them. If too complex, you may lose them. In 1952, Robert Gunning published

```

NEXT_BYTE:  MOV     BYTE PTR DS:[BX*OI+1],0 ;Convert to ASCII string
             INC     CX ;Point to next byte.
             CMP     BYTE PTR DS:[OI],32 ;Is it a space delimiter?
             JZ      NEXT_BYTE ;If no, get next byte.
             MOV     CX,0E ;If yes, points to parameter.
             MOV     AX,3080H ;Open file
             INT     21H ;Via DOS.
             JC      EXIT ;If failed, exit.
             PUSH    AX ;If OK, save file handle.

READ:       POP     BX ;File handle in BX
             PUSH    BX ;and save to close file
             MOV     CX,OFFSET BUFFER ;point to DTA
             MOV     CX,64000 ;ask for 64,000 bytes
             MOV     AH,3FH ;read from file
             INT     21H ;via DOS.
             JC      CLOSE_FILE ;if failed, close file.
             CMP     AX,0 ;Are we at the end of file?
             JNE     PARSE ;if no, parse next batch.
             MOV     WORD_FLAG,0 ;Did the file end with word?
             JZ      GO_DISPLAY ;if no, go display
             INC     WORD_COUNT ;else add one to word count.
             CMP     SENTENCE_FLAG,0 ;Did this file end with sentence?
             JS      GO_DISPLAY ;if no, go display
             INC     SENTENCE_COUNT ;else add ons to sentence count.
             CALL    GO_DISPLAY ;if yes, display results.

GO_DISPLAY:  CALL    OIPLAY

CLOSE_FILE:  POP     BX ;Get file handle
             MOV     AH,3EH ;and close file
             INT     21H ;via DOS

EXIT:        INT     20H ;We are done, so exit.

;-----
; Each byte of the file will be examined and the appropriate ;
; counter (character, word, or sentence) will be incremented. ;
; Long words will be counted as 8 characters or more. ;
;-----
PARSE:       MOV     CX,AX ;Set counter to bytes read.
             MOV     SI,OFFSET BUFFER ;Point to DTA.
             CLO     LODSB ;Get a character.
             AND     AL,7FH ;Strip wordstar high bit
             CMP     AL,32 ;Is it below space character?
             JB      DELIMITER ;if yes, non printable.
             ADD     CNR_COUNT,1 ;Add one to character count
             ADC     CHAR_CT_CARRY,0 ;and one if carry.
             CMP     AL,32 ;Is it a delimiter?
             JA      SENTENCE? ;if no, is it sentence punctuation?
             JNE     SENTENCE_FLAG,0 ;if yes, is it after sentence punc?
             JC      WORD? ;if no, is it at the end of a word?
             INC     SENTENCE_COUNT ;if yes, increment sentence counter.
             MOV     WORD_FLAG,0 ;Is it at the end of a word?
             JNE     WORD_END ;if yes, it marks the end of a word.
             SENTENCE?:  CMP     AL,'.' ;Is it a period?
             JZ      SENTENCE ;if yes, flag as possible sentence.
             CMP     AL,'?' ;Is it '?'
             JZ      SENTENCE ;if yes, flag as possible sentence.
             CMP     AL,'!' ;Is it '!'
             JZ      SENTENCE ;if yes, flag as possible sentence.
             CMP     AL,'-' ;Is it '-'
             JZ      NOT_WORD_END ;if yes, flag as not word and.
             CMP     AL,'0' ;Is it a zero or above?
             JB      NOT_SENTENCE ;if no, it's punctuation.
             CMP     AL,'9' ;Is it a '9' or below?
             JBE     GOT_WORD ;if yes, it's a numerical character.
             AND     AL,3FH ;Capitalise.
             CMP     AL,'A' ;Is it an 'A' or above?
             JB      NOT_SENTENCE ;if no, it's punctuation.
             CMP     AL,'Z' ;Is it a 'Z' or below?
             JBE     NOT_SENTENCE ;if no, it's a punctuation.
             ADD     WORDCHAR_CT,1 ;If we got here, it's alphanumeric
             MOV     WORD_FLAG,0 ;add one to character count.
             INC     BX ;flag that we are in a word
             SHORT NOT_SENTENCE ;increment char count of word
             SHORT NEXT_CHAR ;and flag not sentence end.
             MOV     WORD_COUNT ;flag as possible sentence.
             INC     WORD_COUNT ;and get next character.
             MOV     WORD_END ;Add one to word count.
             INC     WORD_COUNT ;Add word # characters?
             MOV     NOT_LONGWORD ;if no, not a long word
             INC     LONG_WORDS ;else increment long words
             XOR     BX,BX ;and reset char counter.
             MOV     WORD_FLAG,0 ;flag as not in a word.
             MOV     NOT_SENTENCE ;flag as possible sentence.
             MOV     NEXT_CHAR ;Get next character.
             JMP     READ ;GO read next batch. (Figure 1 continues)

```

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```
;*****;  
; Subroutine ;  
;*****;  
;-----;  
; This subroutine is in charge of displaying each line of output. ;  
;-----;
```

```
DISPLAY:  MOV  OL,18          ;First print a limefeed  
          MOV  AH,2         ;just to make the output  
          INT  21h         ;pretty.  
          CMP  CHAR_COUNT,0 ;Old the char. count overflow?  
          JS   NO_CARRY     ;if no, display low half  
          MOV  DX,OFFSET CARRY_64K ;if yes, display 64k+  
          MOV  AH,9  
          INT  21h  
          MOV  BX,CHAR_COUNT ;Same with low half  
          CALL NUMBERS      ;and display.  
          MOV  CX,OFFSET ALPA_STRING ;Display the  
          CALL DISPLAY_TEXT ;text as well.  
  
          MOV  BX,WORD_COUNT ;Word count into BX  
          CALL NUMBERS      ;and display.  
          MOV  CX,OFFSET WORD_STRING ;Display the  
          CALL DISPLAY_TEXT ;text as well.  
  
          MOV  BX,LONG_WORDS ;Long words into BX.  
          CALL NUMBERS      ;and display.  
          MOV  CX,OFFSET LONG_STRING ;Display the  
          CALL DISPLAY_TEXT ;text as well.  
  
          MOV  BX,SENTENCE_COUNT ;Sentence count into BX  
          CALL NUMBERS      ;and display.  
          MOV  CX,OFFSET SENT_STRING ;Display the  
          CALL DISPLAY_TEXT ;text as well.  
  
          MOV  AX,WORDCHAR_CT ;Character count into AX  
          MOV  CX,WORDCHAR_CARRY ;and carry in high half  
          MOV  CX,WORD_COUNT     ;divisor into CX  
          DIV  CX               ;and divide.  
          CALL GET_DECIMAL      ;Convert remainder to decimal  
          MOV  DX,OFFSET CHAR_STRING ;Display the  
          CALL DISPLAY_TEXT     ;text as well.  
  
          MOV  AX,WORD_COUNT     ;Character count into AX  
          MOV  CX,DX             ;and zero in high half  
          MOV  CX,SENTENCE_COUNT ;divisor into CX  
          DIV  CX               ;and divide.  
          CALL GET_DECIMAL      ;Convert remainder to decimal  
          MOV  DX,OFFSET LONG_STRING ;Display the  
          CALL DISPLAY_TEXT     ;text as well.  
  
          MOV  CX,OFFSET POG_INDEX ;Display "Reading index"  
          CALL DISPLAY_TEXT  
          MOV  AX,48             ;First multiply long words by 48.  
          MUL  LONG_WORDS  
          MOV  CX,WORD_COUNT     ;Then divide by word count.  
          DIV  CX  
          CALL GET_DECIMAL      ;Convert remainder to decimal.  
          PUSH DECIMAL           ;Save both halves of the number.  
          PUSH INTEGER  
          MOV  AX,18             ;How multiply sentence count by 18  
          MUL  SENTENCE_COUNT  
          PUSH AX  
          MOV  AX,4  
          MUL  WORD_COUNT  
          POP  CX  
          MOV  CX,18             ;Retrieve word dividend  
          DIV  CX               ;and divide.  
          CALL GET_DECIMAL      ;Retrieve rest of index integer  
          POP  AX  
          ADD  INTEGER,AX        ;and add to this half of index.  
          MOV  AX,DECIMAL  
          ADD  AX,DECIMAL  
          CALL ROUND?          ;See if needs rounding.  
          CALL DISPLAY_TEXT     ;Display the number.  
          MOV  DX,OFFSET GRADE_LEVEL ;Display the  
          CALL DISPLAY_TEXT     ;text as well.  
  
;-----;  
; This subroutine divides to convert hexadecimal to decimal. ;  
;-----;
```

```
NUMBERS:  MOV  CX,10000         ;Get ten thousand by dividing.  
          CALL DIVIDE  
          MOV  CX,1000         ;Get thousands by dividing.
```

(Figure 1 continues)



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## PRODUCTIVITY

### PROGRAMMING/UTILITIES

```

TENTHS:    CALL    DIVIDE
            MOV     CX,100
            CALL    DIVIDE
            MOV     CX,10
            CALL    DIVIDE
            MOV     CX,1
            CALL    DIVIDE
            MOV     DISPLAY_FLAG,0
            RET

;-----;
; This subroutine does the actual dividing and suppresses leading zeros. ;
;-----;

DIVIDE:     MOV     AX,BX
            XOR     DX,DX
            DIV     CX
            MOV     BX,DX
            MOV     DL,AL
            CMP     AL,0
            JE      FLAG
            DISPLAY_FLAG,AL
            OR      DISPLAY_FLAG,0
            JNE     DISP_NUMBER
            MOV     DL,"10H"

DISP_NUMBER: ADD    DL,30H
            MOV     AH,2H
            INT     21H
            RET

;-----;
; This subroutine displays the text via DOS function call 9. ;
;-----;

DISPLAY_TEXT: MOV    AH,9H
            INT     21H
            RET

;-----;
; This subroutine gets the decimal part after integer division. ;
;-----;

GET_DECIMAL: MOV     INTEGER,AX
            MOV     AX,10
            MUL     DX
            DIV     CX
            ADD     DX,DX
            CMP     DX,CX
            JB      NO_ROUND
            INC     AX
            CMP     AX,10
            JB      NO_ROUND
            SUB     AX,10
            INC     INTEGER
            MOV     DECIMAL,AX
            RET

;-----;
; This subroutine displays the integer, decimal point and decimal. ;
;-----;

DISPLAY_TENTHS: MOV    BX,INTEGER
            CALL    TENTHS
            MOV     DX,OFFSET DECIMAL_PT
            CALL    DISPLAY_TEXT
            MOV     DX,DECIMAL
            CALL    DISP_NUMBER
            RET

BUFFER:     ;Data transfer area.

CODE ENDS
END START

```

(Figure 1 ends)

a formula in his book *The Technique of Clear Writing* called the FOG index. PARSE approximates this index to guide you as to the complexity of your writing. Gunning's formula is as follows:

$$.4 (T/W * 100 + W/S)$$

in which

T = number of words with three or

more syllables

W = total number of words

S = number of sentences

For example, a FOG index of 8 indicates an eighth grade reading level. To replicate the FOG index exactly would require using an algorithm that would calculate the number of syllables in a word. To avoid including a monumental amount of code,

## ■ PROGRAMMING/UTILITIES

```

108 REM -- BASIC PROGRAM TO CREATE PARSE.COM
110 OPEN "PARSE.COM" AS #1 LEN = 1
120 FIELD #1,1 AS #
130 CHECKSUM = 0
140 FOR I = 1 TO 102
150   LINESUM = 0
160   FOR J = 1 TO 8
170     READ BYTE
180     CHECKSUM = CHECKSUM + BYTE
190     LINESUM = LINESUM + BYTE
200   IF (BYTE < 256) THEN LET AS = CHR$(BYTE)
210   PUT #1
220 NEXT J
230 READ LINESCHECK
240 IF LINESCHECK <> LINESUM THEN PRINT "Error in Line";200 + 10 * I
250 NEXT I
260 CLOSE
270 IF CHECKSUM = 72698 THEN PRINT "Successful Completion!" : END
280 PRINT "COM file is not valid!" : END
290 DATA 233, 21, 1, 32, 67, 111, 112, 121, 698
300 DATA 114, 105, 103, 104, 116, 32, 49, 57, 608
310 DATA 56, 54, 32, 90, 105, 102, 102, 45, 506
320 DATA 48, 97, 110, 105, 115, 32, 89, 117, 732
330 DATA 90, 100, 105, 115, 104, 105, 110, 840
340 DATA 32, 67, 111, 46, 32, 80, 114, 593
350 DATA 103, 114, 97, 109, 109, 101, 109, 32, 765
360 DATA 105, 121, 32, 77, 105, 99, 104, 97, 733
370 DATA 101, 100, 32, 74, 46, 32, 77, 101, 571
380 DATA 102, 102, 111, 114, 100, 0, 0, 529
390 DATA 0, 0, 0, 0, 0, 0, 0, 0
400 DATA 0, 0, 0, 0, 0, 0, 0, 0
410 DATA 0, 0, 32, 112, 114, 105, 110, 116, 589
420 DATA 97, 90, 100, 101, 32, 99, 104, 97, 736
430 DATA 114, 97, 99, 116, 101, 114, 115, 46, 002
440 DATA 13, 10, 36, 32, 119, 111, 114, 100, 535
450 DATA 115, 46, 13, 10, 36, 32, 119, 111, 402
460 DATA 114, 100, 115, 32, 119, 105, 116, 104, 885
470 DATA 32, 116, 104, 114, 101, 101, 32, 111, 711
480 DATA 114, 32, 109, 111, 114, 101, 32, 115, 720
490 DATA 121, 100, 109, 97, 90, 100, 101, 115, 856
500 DATA 46, 13, 10, 36, 32, 115, 101, 110, 463
510 DATA 116, 101, 110, 99, 101, 115, 46, 13, 701
520 DATA 10, 36, 32, 97, 110, 103, 46, 32, 474
530 DATA 09, 104, 97, 114, 97, 100, 100, 100, 474
540 DATA 114, 115, 47, 119, 111, 114, 100, 46, 766
550 DATA 13, 10, 36, 32, 97, 110, 103, 46, 455
560 DATA 32, 119, 111, 114, 100, 115, 47, 115, 753
570 DATA 107, 110, 116, 101, 110, 99, 101, 46, 704
580 DATA 13, 10, 36, 13, 10, 32, 32, 852, 228
590 DATA 101, 97, 100, 105, 110, 103, 32, 105, 753
600 DATA 110, 100, 101, 120, 13, 10, 36, 32, 522
610 DATA 103, 114, 97, 100, 101, 32, 100, 101, 756
620 DATA 110, 101, 100, 46, 13, 10, 36, 46, 470
630 DATA 36, 54, 53, 53, 51, 54, 43, 36, 300
640 DATA 101, 120, 0, 130, 29, 50, 255, 190, 909
650 DATA 65, 1, 0, 71, 120, 61, 32, 116, 474
660 DATA 258, 139, 215, 104, 0, 61, 205, 33, 1007
670 DATA 114, 50, 00, 01, 83, 106, 40, 0, 656
680 DATA 105, 0, 250, 100, 63, 205, 33, 114, 1030
690 DATA 30, 61, 0, 0, 117, 32, 120, 62, 430
700 DATA 95, 1, 0, 116, 15, 255, 6, 05, 573
710 DATA 1, 120, 62, 96, 1, 0, 116, 4, 400
720 DATA 255, 6, 07, 1, 232, 101, 0, 91, 813
730 DATA 100, 62, 205, 33, 205, 32, 139, 200, 1056
740 DATA 100, 48, 4, 232, 172, 36, 127, 60, 009
750 DATA 10, 10, 131, 13, 10, 32, 32, 372
760 DATA 131, 22, 79, 1, 0, 68, 32, 119, 444
770 DATA 10, 120, 62, 96, 1, 0, 116, 4, 425
780 DATA 255, 6, 07, 1, 120, 62, 95, 1, 635
790 DATA 1, 120, 59, 60, 1, 116, 4, 400
800 DATA 33, 116, 44, 60, 63, 116, 40, 60, 532
810 DATA 45, 116, 50, 60, 40, 114, 59, 60, 560
820 DATA 57, 110, 10, 36, 95, 60, 65, 114, 555
830 DATA 49, 60, 90, 119, 45, 131, 6, 01, 501
840 DATA 1, 1, 131, 22, 103, 1, 0, 190, 437
850 DATA 6, 95, 1, 1, 67, 235, 27, 190, 638
860 DATA 6, 96, 1, 1, 235, 25, 255, 6, 625
870 DATA 05, 1, 131, 251, 8, 114, 4, 255, 649
880 DATA 6, 09, 1, 31, 219, 190, 6, 95, 665
890 DATA 1, 0, 190, 6, 96, 1, 0, 226, 520
900 DATA 131, 233, 71, 255, 178, 10, 100, 2, 1000
910 DATA 205, 33, 131, 62, 79, 1, 0, 116, 627
920 DATA 7, 106, 17, 2, 103, 9, 205, 3, 32, 501
930 DATA 139, 30, 77, 1, 232, 167, 0, 106, 032
940 DATA 90, 1, 232, 232, 0, 139, 30, 85, 817

```

(continues)

PARSE simply assumes that any word over seven letters is likely to be at least trisyllabic. [Ziff-Davis Publishing Company published a full FOG program in the now-defunct PC Disk magazine (see "Readability Analyzer" by Marty Franz, PC Disk, Volume 1 Number 6, 1984). Written in C, the program required more than 13K. Readers interested in experimenting with the effect of other word lengths should see the label WORD\_END in the assembler listing of Figure 1.—Ed.]

**HOW PARSE WORKS** Computers can do things very rapidly, but contrary to the illusion created by their blinding speed, they can do only one thing at any one time. To accommodate the rules for a sentence, PARSE.COM must know that two things

■ PARSE simply assumes that any word over seven letters is likely to be at least trisyllabic.

are true simultaneously. For example, the period must be followed by space to differentiate it from the embedded decimal point. Parse accomplishes this by setting SENTENCE\_FLAG high when a period is encountered, since the period might mark the end of a sentence. On the next loop through the parsing, if a delimiter character is encountered, PARSE knows it has really found the end of a sentence if the SENTENCE\_FLAG is high, as this satisfies the dual criteria for end of sentence.

SENTENCE\_FLAG? Seasoned assembly programmers must bear with me while I explain what a flag is. There is a flag register in the microprocessor, but that is not what I am referring to here. A flag, whether it be one of the three (WORD, SENTENCE, or DISPLAY) that I use in PARSE or some other name in your program, is a label that is assigned a memory location by the assembler. The name is an invention of the programmer merely as a convenient reminder of its purpose.

You might think of FLAG as a rural

Figure 2: A BASIC program that will automatically create PARSE.COM.

## ■ PROGRAMMING/UTILITIES

mailbox with the red flag on the side. If we have mail to be picked up we set the flag "high." If we were so disposed and had nothing else more pressing to do, we might sit by the side of the road and wait for the mailman to come by. However, much like the computer, we have more important things to do in the interim. The common convention is to indicate that action should be taken by setting a flag high—that is, a value greater than zero. Several techniques for flagging can be used. The flag can be set to 1 or FF hex, or just 1 of its 8 bits can be turned on. There are no rules. Remember, this is the programmer's invention, and he should use what is logical and easiest for him to remember.

Now the second event can happen. When the mailman drives down your route, he knows to stop and pick up your mail. He also sets the flag "low" so that tomorrow, when he repeats the route, he won't stop unless you have again set the flag high. (In this analogy, I'm ignoring the other half of his job, that of delivering mail.) In any event, when the flag is reset the cycle can begin again.

The WORD\_FLAG is used similarly. Each time an alphanumeric character is encountered, the WORD\_FLAG is set high. Then when a delimiter is detected, the WORD\_FLAG is checked to see if it is set.

950 DATA	1,	232,	154,	8,	166,	123,	1,	232,	929
960 DATA	219,	8,	139,	38,	89,	1,	232,	141,	851
970 DATA	8,	166,	133,	1,	232,	286,	8,	139,	897
980 DATA	38,	87,	1,	232,	128,	8,	166,	172,	836
990 DATA	1,	232,	193,	8,	161,	81,	1,	139,	888
1000 DATA	22,	83,	1,	139,	14,	85,	1,	247,	592
1010 DATA	241,	232,	162,	8,	232,	212,	8,	166,	1285
1020 DATA	106,	1,	232,	168,	8,	161,	85,	1,	434
1030 DATA	51,	218,	139,	14,	87,	1,	247,	241,	998
1040 DATA	232,	159,	8,	232,	189,	8,	166,	211,	1289
1050 DATA	1,	232,	145,	8,	166,	235,	1,	232,	1832
1060 DATA	139,	8,	184,	48,	8,	247,	38,	89,	737
1070 DATA	1,	139,	14,	85,	1,	247,	241,	232,	968
1080 DATA	128,	8,	255,	54,	93,	1,	255,	54,	848
1090 DATA	91,	1,	184,	18,	8,	247,	38,	87,	658
1100 DATA	1,	8,	164,	4,	8,	247,	38,	85,	639
1110 DATA	1,	89,	247,	241,	232,	99,	8,	88,	997
1120 DATA	1,	6,	91,	1,	88,	3,	6,	93,	269
1130 DATA	1,	232,	183,	8,	232,	116,	8,	166,	878
1140 DATA	255,	1,	232,	72,	8,	195,	185,	16,	958
1150 DATA	39,	232,	38,	8,	185,	232,	3,	232,	953
1160 DATA	24,	8,	185,	188,	8,	232,	16,	8,	559
1170 DATA	185,	18,	8,	232,	12,	8,	185,	1,	625
1180 DATA	8,	232,	6,	8,	198,	6,	97,	1,	548
1190 DATA	8,	195,	139,	195,	51,	218,	247,	241,	1278
1200 DATA	139,	218,	138,	288,	68,	8,	116,	4,	883
1210 DATA	8,	6,	97,	1,	128,	62,	97,	1,	488
1220 DATA	8,	117,	2,	178,	248,	128,	194,	48,	987
1230 DATA	188,	2,	285,	3,	195,	188,	9,	285,	1889
1240 DATA	32,	195,	163,	91,	1,	184,	18,	8,	677
1250 DATA	247,	226,	247,	241,	3,	218,	19,	288,	1442
1260 DATA	114,	13,	64,	62,	18,	8,	114,	7,	383
1270 DATA	45,	18,	8,	255,	6,	91,	1,	163,	571
1280 DATA	93,	1,	195,	139,	38,	91,	1,	232,	782
1290 DATA	159,	255,	186,	15,	2,	232,	285,	255,	1382
1300 DATA	139,	22,	93,	1,	232,	198,	255,	195,	1127

(Figure 2 ends)

If true, the word counter is incremented and the WORD\_FLAG is reset to zero. By resetting the WORD\_FLAG, if we have a word followed by two spaces, we get a proper count of one word instead of two.

After all the counting is done, PARSE reports the results. The largest number PARSE can display is 65,535. A larger

number would require dividing a 64-bit dividend by a 32-bit divisor, a difficult task for the 16-bit registers of the 8088. Unless you are parsing a huge document, printable characters should produce the only count that ever exceeds 65,535. If this is the case, PARSE prints "65,535+" followed by the remaining count.

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PARSE.BAS, whether typed in from the magazine at your keyboard or downloaded from PC-IRS, will automatically create PARSE.COM when run once in BASIC. PARSE.ASM, also listed both here and on PC-IRS, allows you to modify the program but requires you to use a macro assembler (IBM or Microsoft) and the following commands:

```
MASM PARSE;
LINK PARSE;
EXEBIN PARSE.PARSE.COM
```

## PARSE AT A GLANCE

The syntax for PARSE.COM is

```
PARSE [d:] [path] filename
```

Operation: Parse counts and reports the number of characters, words, and sentences in any ASCII text file, and it also calculates an approximate Fog Index grade level readability rating. The averages of the number of characters per word, and words per sentence are also displayed, as is the number of long (here, 8 or more characters) words in the text. WordStar and other "high-bit" files are supported.

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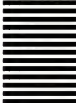
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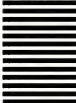
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## ■ PROGRAMMING/UTILITIES

Then, each of the individual counts has to be converted from hexadecimal to decimal. This conversion is done by dividing by 10 to the power of the decimal position. We will be displaying from left to right, so PARSE starts by dividing by 10,000. This tells PARSE what to display in the 10,000 column. The next divisor will be 1,000. This procedure is repeated, decrementing each time by a power of 10 until we reach the ones column.

If the result of division is zero and a number greater than zero has not yet been displayed, the zero is not displayed. Here again a flag is used. In this case it's `DISPLAY_FLAG`, and it is used to suppress leading zeros. The flag is initialized low or zero and not set high until a number greater than zero is displayed. When a zero is encountered, the display flag is checked to see if it is high. If the flag is low, the zero is discarded; if high, the zero is displayed.

The character, word, and sentence counts will always be integers. The characters per word, words per sentence, and approximate FOG index, however, will have decimal remainders which must be rounded up or down to the nearest tenth. The integer part is displayed in the same manner as explained above. The remainder is multiplied by ten and divided by the previous divisor. The remainder of this second division is doubled and compared with the divisor. If it is greater or equal, the digit is rounded up. Rounding is carried out for only one decimal place.

I used PARSE to examine this column and got the following results:

9619 printable characters.

1706 words.

247 words with three or more syllables.

115 sentences.

4.4 avg. characters/word.

14.8 avg. words/sentence.

Reading index

11.7 grade level.

Well, if you made it this far, I must have hit my target. My documents seem to consistently run around 4.5 characters/word and 14.5 words/sentence with a reading level index of 11. How sophisticated, verbose, and perspicuous are yours? ☐

Michael J. Mefford is a microcomputer consultant who works out of his home in Gleneden Beach, Oregon.

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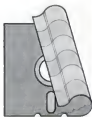
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■ EDITED BY JARED TAYLOR

# SPREADSHEET CLINIC



*1-2-3 tips on saving memory in large spreadsheets, adding a time function, increasing the number of menu choices, and inverting column data.*

## SORTING DATA

In the Spreadsheet Clinic of Volume 5 Number 13 (July 1986) you included a method for reversing the order of data in a column. It is certainly ingenious, but it is simpler to use /Data Fill and /Data Sort.

As shown in Figure 1, use /Data Fill to enter an ascending series of numbers in the column to the left of the column you want to sort. Now sort, in descending sort order, a range that includes both the filled and data columns, using the filled column as the primary sort key. Afterwards, you can delete the filled column. This is fast and simple.

Leons Kovisar  
Minneapolis, Minnesota

*Mr. Kovisar's method is well known but worth reprinting because it is, as he points out, fast and simple. The purpose of the July submission was slightly different. It used a clever algorithm and a complex formula to invert data without intervention from the user. If you need an instant display of inverted data and haven't the time to use Mr. Kovisar's method or to run a macro, read the Spreadsheet Clinic for July 1986.*

## MORE MENU CHOICES

1-2-3's menu macros can be very helpful, but they're limited to eight choices. It's possible, of course, for one menu choice to call another menu, and so on, but people quickly get tired of having to plow through menu after menu to get what they want.

The menu system in Figure 2 allows many more than the eight options of a nor-

1. BEFORE SORT		2. AFTER SORT	
Filled column	Original data	Filled column	Original data
1	46	10	98
2	54	9	91
3	31	8	55
4	1	7	37
5	79	6	23
6	23	5	79
7	37	4	1
8	55	3	31
9	91	2	54
10	98	1	46

Figure 1: The results of using /Data Fill and /Data Sort to invert the contents of a column.

	C	D	E	F	G
1	**	Put cursor on file name.			
4	**	Hit Alt-R to retrieve file.			
5					
6	FILE1	FILE6	FILE11	FILE16	FILE21
7	FILE2	FILE7	FILE12	FILE17	FILE22
8	FILE3	FILE8	FILE13	FILE18	FILE23
9	FILE4	FILE9	FILE14	FILE19	FILE24
10	FILE5	FILE10	FILE15	FILE20	FILE25
11					
12					
13					
14	\R	/c"BLANK"			
15		/fr			
16	BLANK				
17		-			

Figure 2: A menu that offers many more than eight choices.

mal 1-2-3 macro menu. This is a menu that controls the retrieval of different worksheets, each identified as FILE1, FILE2, FILE3, etc. To get the file you want, just follow the directions on the screen: put the cursor on the name of the file you want and hit Alt-R.

Bob Clark  
Ft. Collins, Colorado

*Such a menu can also be used to control menu branching. Copy the cell the cursor is on to the blank cell thus:*

```

/xc
BLANK
-
```

*The macro will now branch to the named routine.*



## ■ SPREADSHEET CLINIC

## ADDING @ TIME TO IA

Releases 1A and 1A\* of 1-2-3 have an @today function that returns the current date, but they don't have a time function. Figure 3 contains a DEBUG script that will let you replace the @rand function with an @time function. The patch invalidates @rand, so you should use it only if you don't need random numbers.

To use the patch, do the following:

1. Use a pure-ASCII word processor—such as EDLIN or the DOS COPY CON: command—to write a DEBUG script file; call it TIME.123. If you have Release 1A of 1-2-3, TIME.123 should contain the 16 lines in the top part of Figure 3, but without the semicolons or the text that follows them. If you have Release 1A\*, replace E086 with E09F, CFCB with CFE4, and F847 with F880, as detailed in the comments to the DEBUG script. Be sure to leave the line after the RET instruction blank and to hit Enter after each line, including the last one.

2. Make a backup copy of 123.EXE from your 1-2-3 system disk and set it aside in case something goes wrong. Copy 123.EXE from the 1-2-3 system disk to the same disk as TIME.123. Then, take DEBUG.COM from your DOS system disk and copy it also to the same disk.

3. Rename the copy of 123.EXE on this working disk and call it 123.TMP.

4. Run DEBUG so as to patch 123.TMP. Do this by entering the following command at the DOS prompt:

```
DEBUG 123.TMP < TIME.123 <Enter>
```

5. Rename the newly patched 123.TMP file back to 123.EXE.

6. Copy 123.EXE back to your 1-2-3 system disk and run the program.

The @time function should now return the system time as a number, without leading zeros, in the form HHMM (e.g., 954). Every time the worksheet recalculates, @time will be recalculated. If you need the current time as a label and want it to be more readable, run the macro in Figure 3. The current cell will now contain a label in the form HH:MM with a leading zero (e.g., 09:54).

@rand will no longer work. If you save a worksheet that uses @time and then retrieve it with an unpatched version of 123.EXE, all @time functions will appear

## DEBUG script:

```
R ; Gets around problem of A as 1st DEBUG command
A CS:E086 ; Patch &rand. E09F in 1A*.
MOV BX,2C ; Use DOS function call to get the time
INT 21 ; [CH = Hours, CL = Minutes]
MOV AL,64
MUL CH ; AX = Hours * 100
MOV CH,0
ADD AX,CX ; AX = Hours * 100 + Minutes
MOV DX,0 ; Clean up to call the 123 data post
CLC ; processing routine (presumably)
CALL CFCB ; Call it. CFE4 in 1A*.
RET ; Return to calling routine

E CS:F847 "TIME" ; Change "RAND" to "TIME". F880 in 1A*.
W ; Writes out the patched file
Q ; Quit DEBUG
```

Macro to place time into cursor cell as a label, in the form HH:MM

<pre>{* +10000+@time [edit]{calc [left]{left: [home] [del] }</pre>	<pre>Get the "time" Convert formula to a value Insert the colon Convert number to a label Delete the leading digit (1) Enter label into the cell</pre>
--	--

Figure 3: A DEBUG patch that replaces @rand in early versions of 1-2-3 with @time. The lower part of the figure contains a macro that converts the results of the @time function to a label in the form HH:MM.

as @rand. Conversely, if you use an unpatched version of 123.EXE to save a spreadsheet that uses @rand, and then use the patched version to retrieve the spreadsheet, the @rand functions will appear as @time.

Raymond Young  
Bloomington, Minnesota

*This is an edifying patch that works precisely as Mr. Young describes. Although I thought I had 1-2-3, Release 1A, it was the values for 1A\* that worked for me, so try the other set if the first one fails.*

*I assume you could wipe out some other function if you were fond of @rand. I would ditch @atan or @atan2 if I knew enough about the innards of 123.EXE to figure out how.*

## QUICK GRAPHS

Sometimes when you're working with a spreadsheet, you want to print a graph quickly. With Symphony it takes just too long to build a graph, save it in a .PIC file,

move to the Printgraph program, set parameters, and finally print.

What I do instead is to load the DOS GRAPHICS.COM program before I load Symphony. This lets me print the graph I have displayed by hitting Shift-PrtSc and dumping the screen to a dot matrix printer.

You can improve this method by using the space in the bottom corners of the screen that is intended for window and settings names. Rather than use the usual names, use descriptive titles that make the graph easier to understand.

Bill Stutsman  
Baytown, Texas

*I am passing along this tip with the following important caveat: It didn't work for me. It should work, though, if your hardware is what GRAPHICS.COM expects. According to my DOS (2.1) manual, GRAPHICS.COM will successfully dump a graphics screen if you are using the IBM 80-cps Graphics Printer and the IBM colorgraphics adapter. I wasn't.*

*Furthermore, Mr. Stutsman's tip should work for any number of spreadsheet programs that display graphics. If you're using two screens, one for text and the other for graphs, however, it will probably dump the text screen, not the graphics screen.*

#### SIMPLIFYING SETTINGS

When you build very large *Symphony* spreadsheets, you can waste memory by using unnecessary window settings. My models use a lot of windows for menus, error messages, data input, etc. I often add these after the basic spreadsheet is laid out. Each new window carries with it the settings of the parent window, including such things as column width overrides and hidden columns.

*Symphony* doesn't list the overrides brought along to a new window, but you can find out from the global settings report in *The Cambridge Spreadsheet Analyst*.

(This is where I learned that most of the settings attached to each window were wasting memory.) I was able to reduce a worksheet from 650K to 600K just by getting rid of unnecessary settings—mainly by using Menu Width Restore.

However, the best solution is to prevent the problem. A simple way to do this is to create your own window-building window. I call mine SPAWN, and I make it the parent for all other windows by using

the command: Services Window Use SPAWN. Since I created SPAWN before any overrides were in effect, the new windows I create from it will also be clean. Further, since large models run faster if the Auto-Display setting for each window is set to No, I put this setting in SPAWN, which passes it on to each new window created from it.

Brian Underdahl  
St. Louis, Missouri

■ I was able to reduce a worksheet from 650K to 600K just by getting rid of unnecessary settings.

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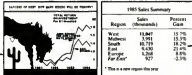
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L'Es  
L'Es  
L'Es

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■ EDITED BY CRAIG L. STARK

# POWER USER



*Turning SideKick into a printer controller, modifying Crosstalk's wait/redial timing, and dBASE tips for debugging menu programs and reusing old records.*

## PRINTER CONTROL WITH SIDEKICK

The printer control program described in Programming/Utilities (Volume 5 Number 12) was neat, but who needs another memory-resident utility? Jeff Prossie mentioned that the code was compatible with SideKick, but if one already has SideKick (or the equivalent), why not just do the following:

1. Using any editor that allows control characters, create a file listing all your printer commands. (With SideKick, use 'P' to create a control character—so that 'PL' becomes 'L', for Form Feed.) Tailor the selections to your printer(s), using the

codes specified in the printer manual. A sample file, for the IBM ProPrinter, is shown in Figure 1.

2. When you want to configure the printer, bring up SideKick's notepad and retrieve the printer file.

3. Mark the desired control character sequence. (In SideKick, mark the block with 'KB' and 'KK'.)

4. Press the Print Block key (or use 'KP' in SideKick).

This method is more flexible than messing with assembler programs. If you have more than one printer, you can create separate files for each printer or combine them into a multipage file. You could even

create macros using the SuperKey/SideKick combination so that you could call up SideKick and configure your printer with a single keystroke—without ever leaving an application.

Bill Youstra  
Rockville, Maryland

*This approach will also let you use print commands that your word processor doesn't know about. For example, if your printer can use italics but your word processor can't, simply add a print pause command at the appropriate spot in your text, then send the printer command to turn italics on or off.*

### ProPrinter Control Menu Mark & Print the Desired Code

Configure	Print Modes	On	Off	Format
Select Char Set 1 ^[7	Condensed	^O	^R	Set Form Length (inches) ^[C#n
Select Char Set 2 ^[6	UnderScore	^[-1	^[-0	Set Form Length (lines) ^[Cn
Select All Char's ^[N	Emphasized	^[E	^[F	1/8 inch Line Spacing ^[0
Select Printer ^[Q	Double Stk	^[G	^[H	7/72 inch Line Spacing ^[1
Deselect Printer ^[Q3	NLQ	^[I2	^[I0	n/216 inch Line Spacing ^[3n
Set Top of Form ^[4	DoubleWide	^[W1	^[W0	Store n/72" Line Spacing ^[An
Clear Horiz Tabs ^[D0	SuperScript	^[S0	^[T	Start Line Space set above ^[2
Clear Vert Tabs ^[B0	SubScript	^[S1	^[T	Auto Perf Skip n Lines ^[Nn
Reset All Tabs ^[R	Unidirect	^[U1	^[U0	Auto Perf Skip Off ^[O
	OverScore	^[_1	^[_0	
	Auto LF	^[51	^[50	
	12 CPI	^[:	^[R	
				<b>Movement</b>
				Form Feed ^[L
				Backspace ^[H
				Horizontal Tab ^[I
				Vertical Tab ^[K

-----  
Tabs Set

Set Horiz Tabs 3 ^[D n1 n2 n3 n4 n5 ...  
Set Vert Tabs 3 ^[B n1 n2 n3 n4 n5 ...

Figure 1: An IBM ProPrinter control set for use with SideKick, as an alternative to SETUP.COM. Note that in SideKick the Ctrl character (^) will not show up on your display screen.

## ■ POWER USER

*One point that might not be obvious: You can't enter an escape code in the printer command file by hitting the Esc key, since SideKick uses that key as a command. However, you can enter an escape in the file by typing "P <Esc>". In SideKick, this will show up on-screen as [.*  
—M. David Stone

### CROSTALK TIMING

*Crosstalk XVI* automatically adds the command GO q45/45 as the last line in a command file. This instructs *Crosstalk* to call the desired phone number, wait 45 seconds for a connection, then wait another 45 seconds before redialing. The "q" instructs *Crosstalk* not to sound an alarm when a connection is made. This command is added each time a new file is created or an old file resaved.

In most cases, I prefer to have the program wait 30 seconds for a connection and retry every 15 seconds. Normally, the only way to change these parameters is to go into the file with a text editor after saving it in *Crosstalk*, but I have developed a patch that changes the defaults directly.

To patch *Crosstalk* 3.5, put DEBUG.COM and a copy of XTALK.EXE on the same drive, log on to that drive, and run through the following session. (Lines shown without the DOS prompt or the DEBUG hyphen prompt are DEBUG responses).

The fourth line in Figure 2 below shows the "q45/45" default in hex on the left and ASCII on the right, starting at memory address 44BB. Line 5 changes the first 45 (hex 34 35) into 15 (hex 31 35). Line 6 changes the second 45 to 30. Lines 7 and 8 confirm that the change was performed properly.

Also note that address 44BB can be

## ■ I have developed a patch that changes *Crosstalk*'s defaults directly.

changed to 72 if you want the alarm to sound upon connecting to a service. Users of Version 3.4 will need to alter the values beginning with address 91D2 and ending with 91D7.

Making this change to your program will not affect your existing command files. In order to change those files you must resave the settings or edit the file with a text editor.

John DeLuna  
Arlington, Texas

*More generally, since there are so many different versions of Crosstalk available, you can start your DEBUG session with the command*

S 0000 FFFF "q45/45"

*This will search for the phrase in quotes and return the starting address of the default setting. For my copy of Crosstalk XVI, Version 3.6, the starting address is 5089.—M. David Stone*

### DBASE BY THE WEEK

Many of my company's reports need to be summarized by the WEEK OF, so I needed a way to convert dBASE III data fields to their preceding Sunday. Instead of using a complicated program, the method turns

out to be delightfully simple:

```
weekof=date+1-DOW(date).
```

Sigrid Jungklaus  
Neider Otm, West Germany

*This works like a charm but perhaps needs a little explanation. To produce a report by WEEK OF, start with*

```
INDEX ON date+1-DOW(date).
```

*Then modify your report .FRM file to use the same algorithm for the Subtotal Field. If your week starts on Sunday, just use date+2-DOW(date).*

*Notice, however, that the INDEX ON command will not differentiate between a Monday and a Friday: the algorithm converts them all to Sunday. If you are producing a Summary Report, this won't matter; but a detailed listing will be in WEEK OF order, with Thursdays and Mondays all jumbled up.*

*If you need a detailed report in actual date order, you can take two different approaches. One way is to SORT the file on date first, then do the INDEX. The other approach requires a more complicated INDEX ON command. The index must use the WEEK OF algorithm as its dominant element and then differentiate between weekdays. Because the WEEK OF algorithm is a Date-type variable, however, you unfortunately can't concatenate character strings or add numerics to it, which is a pain in the neck.*

*The INDEX ON command suggested below converts the WEEK OF Sundays into an integer and then adds the day-of-the-week as a trailing decimal:*

```
. x="date+1-DOW(date)"
. INDEX ON 100*WEEKS(AX)+DAY(AX)+
  +DOW(date)/10 TO <filename>
```

*This INDEX ON formula produces indexable values in the form:*

```
Sun, 1/05/86 =>105.1
Mon, 1/06/86 =>105.2
Sun, 1/12/86 =>112.1
Tue, 1/14/86 =>112.3
```

*Whether you SORT first or use this longer INDEX ON command, the Subtotal Formula in your .FRM file remains the same.*

*If you enter "WEEK OF:" as the Subtotal Heading and use the following as the Subtotal Expression*

```
CDOW(date+1-DOW(date))+1, '
+DTOC(date+1-DOW(date))
```

```
A> ren xtalk.exe xtalk.tmp <Enter>
A> debug b:xtalk.tmp <Enter>
-> d 44BB 44C0 <Enter>
XXXX:44B0 71 34 35 2F 34 35 q45/45
-e 44BC 31 <Enter>
-e 44BF 33 30 <Enter>
-d 44BB 44C0 <Enter>
XXXX:44B0 71 31 35 2F 33 30 ql5/30
-w <Enter>
-q <Enter>
A>ren b:xtalk.tmp b:xtalk.exe <Enter>
```

Figure 2: A DOS and DEBUG session to patch *Crosstalk*'s default timing.

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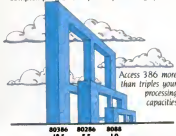
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## ■ POWER USER

■ We've found a way to save considerable time in *dBASE* and to reduce wear and tear on the equipment as well.

*you can create an attractive, complete Subtotal Heading that displays in the format: "WEEK OF: Sunday, January 6, 1986."—Brad Stark*

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Since the file is INDEXed, the empty key field(s) cause these recycled records to appear at the top of the file. When entering new information, we first GO TOP and check if the key field of this record is blank; if not, we know that no reusable record is available and append a new one (see Figure 3).

Phillip M. Barber  
Lee College  
Cleveland, Tennessee

*That's having your records and eating them, too!*

*If you have high turnover in a database (and normally USE it with an INDEX), re-*

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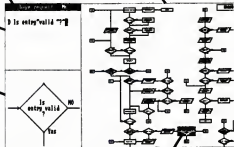
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## ■ POWER USER

```
GO TOP
IF <key field> = " "
  * Enter new data into this recycled record
ELSE
  APPEND BLANK
  * Enter new data into a new record
ENDIF
```

Figure 3: A dBASE code segment that determines if a new record is needed.

```
. recycle=[REPL Name with "", Course with "", Year with 0]
```

Figure 4: This line creates a useful memory variable for interactive applications.

```
*** DOTPROM.PRG
@ 16,0 CLEA
@ 17,79
cuscom="incoming"
DO WHILE cuscom>" "
  ?
  @ ROW(),0 SAY [Enter any dBASE command]
  ?? [ (except one using "&") <CR>=>Xit]
  ACCE " " TO cuscom
  IF cuscom>" "
    SET TALK ON
    &cuscom
    SET TALK OFF
  ENDI
ENDDO
RETU
```

Figure 5: A way to simulate the dBASE dot prompt so that you can find what's going on inside your program.

cycling records in this way will save loads of time, not only because PACKing is less frequent, but also because it's faster to REPL data than to APPEND a new record.

An additional advantage is that unwanted records are dispatched immediately instead of skulking around on death row, waiting for the file to be PACKed. Further, every time a file is PACKed, there's the danger of a power outage or some other glitch.

If you will be recycling records interactively from the dot prompt, it might be convenient to create a memory variable to do the work, SAVE it in a .MEM file, and RESTORE it for use the next day. As a simple example, suppose your file has 3 fields: Name (C,20), Course (C,6), and Year (N,4), and the file is INDEXed on Name. Entering the statement in Figure 4 will create the memory variable.

When you want to blank an obsolete record, simply position on it and enter:

```
.&recycle
```

Because the Name field is now empty (more precisely, because dBASE will evaluate Name=" " as true), the index will position this record at the top of the file where you needn't even perform a FIND to locate it: just GO TOP. "New shoes for old," as the nursery rhyme has it—and no waiting, as you like it.—Brad Stark

### DEBUG WITH DOTPROM

When debugging a menu-driven program, it's often useful to be able to step outside for a moment, simulate the " " prompt so you can issue commands interactively, and then resume program operation. The DOTPROM.PRG shown in Figure 5 works perfectly for any command that does not use a macro ("&").

For the menu choices that call DOTPROM.PRG, I just display a quiet little " " at the right screen margin. When a " " is entered, the program is routed to is-

■ Unwanted records are dispatched immediately instead of skulking around on death row, waiting for the file to be PACKed.

sue the DO DOTPROM command, which clears the screen below line 16, issues a realistic-looking " " prompt, and awaits your dBASE command.

Any command you enter is picked up as a memory variable: cuscom. If you enter nothing (i.e., simply hit the Enter key), you return to the calling program; otherwise dBASE issues your command and returns the next " " prompt.

Ed Hurley  
West Haven, Connecticut

How many times have you entered a menu choice with finger poised to slam down the Escape key instantly so you could find out what could possibly be happening to cause so much trouble in your program?

dBASE III Plus does provide a SUSPEND command that gives you the full power of a real " " prompt, but you must enter RESUME to restart your program. For earlier dBASE releases, there is no alternative to DOTPROM.PRG. Of course, when you use Mr. Hurley's method, you lose whatever is on the screen below line 16, but during debugging that's a small price to pay.—Brad Stark

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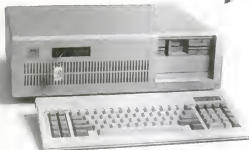
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■ PAUL SOMERSON

# USER-TO-USER

*A DISKCOPY patch that makes multiple copies effortlessly, a program to create custom color-changing files, and a power technique for deleting selective files.*

## LIGHTNING-FAST DISKCOPIES

I often need to make multiple copies of a floppy disk. DOS's DISKCOPY utility forces you to reinsert the source disk for each copy made. If you need ten copies of a disk, you must read the source disk ten times. There has to be a better way!

I traced through the different DOS 3.x versions of DISKCOPY.COM code using DEBUG and found that all you need to do is reset 2 bytes in memory to zero and branch to the write disk routine after the question: "Copy another diskette (Y/N)?" occurs.

Type in the appropriate DEBUG scripts for DOS 2.1, 3.1, or 3.2 (in Figures 1, 2, and 3), using the DOS COPY CON command or any pure-ASCII word processor. Make sure you leave a blank line before the W in each case, and hit the Enter key at the end of each line, especially the last one. Then put the script file you just created, DEBUG.COM, and DISKCOPY.COM on your disk and type

```
N DISKCOPY.COM
L
N DISKCOPY.COM
A 240
MOV WORD PTR [01AA],050C
JMP 200

W
Q
```

**Figure 1:** SCRIPT.21 script for customizing DOS 2.1 DISKCOPY.COM. Create it using the DOS COPY CON command or any pure-ASCII word processor, then at the DOS prompt type DEBUG < SCRIPT.21. Be sure to leave a blank line before the W and hit the Enter key after each line, especially the last one.

## DEBUG < SCRIPT.21

(changing the extension as appropriate for the DOS version you're using).

To use the program, you must have enough memory to hold the disk you are

```
N DISKCOPY.COM
L
N DISKCOPY.COM
A 215
MOV DX,07C4
PUSH DX
PUSH CS
CALL #CA0
CALL #C50
MOV DX,07F0
PUSH DX
PUSH CS
CALL #CA0
MOV AL,[0120]
AND AL,DF
CMP AL,[07A0]
JE #23C
CMP AL,[07A1]
JNE #215
STC
JMP #24E
MOV WORD PTR [0111],0000
CALL #3C2
CLC
JMP #215
NOP
NOP
NOP
NOP
NOP
NOP
RET

W
Q
```

**Figure 2:** SCRIPT.31 script for customizing DOS 3.1 DISKCOPY.COM. Create it using the DOS COPY CON command or any pure-ASCII word processor, then at the DOS prompt type DEBUG < SCRIPT.31. Be sure to leave a blank line before the W and hit the Enter key after each line, especially the last one.

copying as well as DOS and the program DISKCOPYM.COM—about 448K.

Note, however, that while the 3.x versions prompt you to insert a new blank disk after finishing the first copy, the 2.1 version doesn't. If you try the 2.1 version, af-

```
N DISKCOPY.COM
L
N DISKCOPY.COM
A 70E
MOV DX,0EF4
PUSH DX
PUSH CS
CALL 13D2
CALL 136A
MOV DX,0F20
PUSH DX
PUSH CS
CALL 13D2
MOV AL,[0369]
AND AL,DF
CMP AL,[0ED0]
JE #735
CMP AL,[0ED1]
JNE #70E
STC
JMP #747
MOV WORD PTR [035C],0000
CALL #7AD
CLC
JMP #70E
NOP
NOP
NOP
NOP
NOP
NOP
RET

W
Q
```

**Figure 3:** SCRIPT.32 script for customizing DOS 3.2 DISKCOPY.COM. Create it using the DOS COPY CON command or any pure-ASCII word processor, then at the DOS prompt type DEBUG < SCRIPT.32. Be sure to leave a blank line before the W and hit the Enter key after each line, especially the last one.



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## PRODUCTIVITY

### ■ USER-TO-USER

ter the initial copy is made the program will ask: "Copy another (Y/N)?" At this point insert the new disk, since the program will begin making the new copy as soon as you hit the Y.

Phil Steele  
Montville, New Jersey

*This is a patch that is long overdue. Perhaps the original DOS designers felt that allowing such quick copies would encourage piracy, but this is nonsense, especially these days. If you don't want to patch your DISKCOPY.COM, by the way, you can always set up a RAMdisk the exact size of a floppy disk, diskcopy your source disk into it, and then use the RAMdisk as the new source disk and copy back onto floppies.*

### MORE BROWSE POWER

The FASTSCRN.BAS program in User-to-User (Volume 5 Number 17) for dis-

■ Using FASTSCRN.BAS for displaying screens rapidly was good, but there is an even easier way to accomplish the very same thing.

playing screens rapidly was good, but there is an even easier way to accomplish the very same thing. Just copy the BROWSE.COM utility written by Charles Petzold in Programming/Utilities (Volume 5 Number 6) to another file named

```
100 ' PCCOLOR.BAS -- by PC Magazine
110 ' Creates PCCOLOR.COM program with or without CLS feature
120 '
130 ' --- Setup ---
140 '
150 SCREEN 0:KEY OFF:COLOR 3,0,0:LOCATE ,0:CLS:OIN C1$(40),C2$(36)
160 FOR A=1 TO 40:READ A$:C1$(A)=A$:NEXT
170 FOR A=1 TO 36:READ A$:C2$(A)=A$:NEXT
180 '
190 ' --- Ask which version to create ---
200 '
210 PRINT TAB(18); "Do you want this to clear the screen (Y/N)? ";
220 W$=INPUT$(1):IF INSTR("YyNn",W$)=0 THEN 220 ELSE PRINT W$:PRINT
230 '
240 ' --- Get Input ---
250 '
260 COLOR 3:PRINT "FOR BORDER -- ";GOSUB 510:BORD$=I$
270 COLOR 3:PRINT "Anything higher than 7 will blink!"
280 COLOR 3:PRINT "FOR BACKGROUND -- ";GOSUB 510:BACK$=I$
290 COLOR 3:PRINT "FOR FOREGROUND (TEXT) -- ";GOSUB 510
300 IF I$=BACK$ THEN BEEP:GOTO 290 ELSE FORE$=I$
310 '
320 ' --- Create File ---
330 '
340 OPEN "PCCOLOR.COM" AS 1 LEN=1:FIELD 1,1 AS B$
350 IF INSTR("Nn",W$) THEN 380
360 C1$(14)=BORD$:C1$(28)=BACK$:FORE$
370 FOR A=1 TO 40:LIST B$=CHR$(VAL("A$"+C1$(A))):PUT 1:NEXT:GOTO 480
380 C2$(6)=BORD$:C2$(23)=BACK$:FORE$
390 FOR A=1 TO 36:LIST B$=CHR$(VAL("A$"+C2$(A))):PUT 1:NEXT
400 PRINT "PCCOLOR.COM created...":CLOSE:END
410 '
420 ' --- DATA ---
430 '
440 DATA 29,C8,1E,50,B8,03,00,CD,10,B0,00,0B,B0,00,00,CD,10,B0,00,06
450 DATA B9,00,00,BA,50,20,07,00,CD,10,B4,02,BA,00,00,07,00,CD,10,CD
460 DATA B4,0B,07,00,03,00,CD,10,B8,00,00,0E,0E,0E,00,00,09,0E
470 DATA 07,C8,44,01,00,03,C6,02,09,05,C9,75,F4,B8,00,4C,CD,21
480 '
490 ' --- Input Subroutine ---
500 '
510 COLOR 3,0:PRINT "Pick a color: ";
520 COLOR 0,7:PRINT "0";COLOR 0:PRINT CHR$(32);
530 FOR A=1 TO 15:COLOR A,0:PRINT HEX$(A);CHR$(32);NEXT:PRINT
540 I$=INPUT$(1):IF INSTR("0123456789ABCDEFebcdef",I$)=0 THEN 510
550 PRINT STRING$(80,196);RETURN
```

Figure 4: PCCOLOR.BAS program to create PCCOLOR.COM utility that will customize your screen colors and offer you the option of first clearing the screen or leaving it alone.



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## ■ USER-TO-USER

DISPCRN.COM and patch it by typing the following at the DOS prompt:

```
DEBUG DISPCRN.COM
-E 02AC EB 37
-W
-Q
```

Use any editor to create an ASCII text file (e.g., MENU.TXT) and display this text file with the command

```
DISPCRN MENU.TXT
```

Although it's true this method does not allow you to specify screen colors as part of the menu, it has the advantage of working directly with the text file instead of creating an additional .COM file.

To change a menu, you need only change the actual text in the file. Since the program displays the end-of-file character as a right arrow, be sure to add a few extra carriage returns to the end of your text file so that it exceeds 25 lines.

The DISPCRN program works exactly like the BROWSE command until the first screen has been displayed. The patch inserts a JMP instruction at this point, and the program branches to the middle of the terminate sequence, closes the file, and returns control to DOS, dBASE, or wherever it was called from.

John Hollenberg, M.D.  
Los Angeles, California

*This will work, but it has several drawbacks. BROWSE.COM picks up the existing screen colors, so if you want different ones you have to run a short color-changing program beforehand.*

*(We put together the master PCCOLOR.BAS program in Figure 4, which lets you choose your border, text, and background colors, and also lets you decide whether or not you would like to clear the screen before you set the colors. PCCOLOR.BAS creates a short program called PCCOLOR.COM. If you want different color clearing and setting versions, rename the old versions before you create the new.)*

*Another drawback to this method is that DISPCRN.COM leaves the cursor where it was when DOS executed it—which means you may end up with a distracting blinking cursor halfway up the left edge of your screen. You have to fill out the text file*

*with carriage returns to avoid displaying CHR\$(26)s. And, of course, using it means you have to keep one more file on your disk in addition to the text files it displays.*

*However, if you haven't yet tried BROWSE.COM, do yourself a favor and download a copy from the PC Magazine IRS or type in the listing from Volume 5 Number 6. You won't believe you ever got along without it.*

### EASY GLOBAL ERASING

I frequently want to delete all the files in the current directory. The command DEL \*.\* will do it but always asks, "Are you

■ DALL.BAT fools DOS into thinking it's deleted a subset of all the files in the directory. The >NUL sends the "n files deleted" message into the Twilight Zone.

sure?" I got tired of answering that question, so I invented the file DALL.BAT:

```
ECHO OFF
REN *.* $*.* >NUL
DEL $*.* >NUL
IF EXIST *.* DEL $*.* >NUL
```

This fools DOS into thinking it's deleting just a subset of all the files in the directory. It renames all files to have a "\$" as the first character, then deletes those files. The >NUL sends the "n files deleted" message into the Twilight Zone.

Unfortunately, in the rare cases that two filenames differ only in the first letter, or if the first letter is "\$", some files will not get deleted. Therefore, after the first delete, we delete anything left over. In real life this almost never occurs, but if it does all that will happen is that you'll get the "Are you sure?" prompt.

To enhance this so that you get no error

messages if you run it on an empty directory, IF EXIST clauses may be added to the REN and DEL commands.

Dave Tocus  
Gaithersburg, Maryland

*Of course, you could erase all the files in a directory with the following ERASE.BAT batch file:*

```
ECHO OFF
FOR %%F IN (*.*) DO DEL %%F > NUL
```

*If you omit a carriage return from the end of the second line, you'll see each file deleted one by one. However, if you include a carriage return, while you won't see the individual file deletion messages, you'll get a "Batch file missing" error message.*

*The technique described by Mr. Tocus is clever, but it won't work properly since it will delete itself halfway through the process and grind to a halt. It's possible to adapt it, with a pair of batch files. First: DALL.BAT*

```
ECHO OFF
MD UPONE
CD UPONE
COPY ..\DALL.BAT > NUL
COMMAND /C DELALL
CD ..
DEL UPONE\DELALL.BAT
RD UPONE
DEL DALL.BAT
```

Next, DELALL.BAT:

```
COPY ..\DALL.BAT >NUL
:START
CTTY NUL
REN ..\.* $*.*
CTTY CON
DEL ..\$*.*
IF EXIST ..\.* GOTO START
COPY DALL.BAT .. >NUL
DEL DALL.BAT
```

*The idea intended here is to create another subdirectory that is located one level up and copy the batch file in and out, but that's extremely clunky. The one real improvement is that if the DELALL.BAT file does trip over two files that are exactly the same except for the first letter, it will simply start over again. DELALL.BAT assumes that you don't have any files that begin with \$. If you did have such files, you could also add a third IF statement to rename them to something else and then de-*

## ■ USER-TO-USER

■ One real improvement is if the DELALL.BAT file does trip over two files that are exactly the same except for the first letter, it will simply start over again.

lete those—but the two batch files are overcomplex already.

Also, please be sure to note that >NUL won't suppress error messages, but CTTY NUL will. If you use CTTY NUL be very careful to bring your system back with the command CTTY CON. And even this technique won't handle the missing batch file error you'll get if you insert a carriage return at the end of the last line of DELALL.BAT.

The obvious solution to this problem is to create a one-line batch file that you use from another subdirectory. If you're in \V2\3 and you want to delete everything in \V2\3\4, you can do it with the batch file containing the line

DEL \V2\3\4.\* \* < Y

For this solution to work you would need a tiny file on \V2\3 called Y that contained simply two characters—a Y and a carriage return. If you wanted, you could try this with replaceable parameters, but you'd have to be careful that you didn't erase the wrong files through a silly but fatal typing error.

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■ CHARLES PETZOLD

# PC TUTOR



*QuickBASIC and .COM approaches to putting pixels on paper, using EGA graphics and the IBM Graphics Printer and compatibles.*

## PRINTING EGA GRAPHICS

I was disappointed to find that the Programming/Utilities columns on the Enhanced Graphics Adapter ("Exploring the EGA," Volume 5 Numbers 14 and 15) had nothing about printing EGA graphics displays on the printer. I originally bought an EGA and a monochrome display for additional graphics capability, but only recently with DOS 3.2 have I actually started to use the EGA graphics.

But what's the point of generating graphics if I can't put them on paper?

Gerhard Opel

Redmond, Washington

*In those Programming/Utilities columns, I deliberately avoided the topic of printing EGA graphics displays, since it's a subject that reveals nothing very interesting about the EGA itself. It's principally a printer problem.*

There is no real standard for implementing graphics on printers. If I were to write an EGA graphics screen dump program, it would have to be for the IBM Graphics Printer and compatibles, because that's as close to a standard as exists right now. That's fine for people with IBM Graphics Printers, but not for everybody else. Even for people with IBM Graphics Printers, the printer is not going to do very well printing 16-color graphics. The printer does not even have enough resolution to use different dot densities for the different colors. The usual method (printing dots for every color except background) sometimes looks OK and sometimes doesn't.

However, if you're doing EGA graph-

ics programming in BASIC, it's fairly easy to write your own screen dump subroutine to do what you want it to. This requires some familiarity with the graphics control sequences of your printer. Figure 1 shows such a subroutine and demonstration program, written in QuickBASIC 2.0. The top of the program switches to an EGA graphics mode, draws 100 random circles, and then calls the PRINTSCREEN subroutine.

(You could also write this program in BASICA 3.2 if you added line numbers and used a GOSUB instead of a CALL. But I've seen QuickBASIC 2.0 discounted as low as \$59, so I don't think it makes much sense for a BASIC programmer—professional or amateur—to continue using BASICA when something so much better is available at such low cost.)

As written, the PRINTSCREEN sub-

```
' Printing EGA Graphics Screens from QuickBASIC 2.0
' -----
SCREEN 9          ' Use 16 for EGA on monochrome
FOR I% = 1 TO 100
  CIRCLE (INT(640*RND),INT(350*RND)),INT(100*RND),INT(16*RND)
NEXT I%
CALL PRINTSCREEN
SCREEN 8          ' Restore to normal
END

' PRINTSCREEN Subroutine
' -----
SUB PRINTSCREEN STATIC
  WIDTH LPRINT 255
  LPRINT
  FOR ROW% = 0 TO 349 STEP 8
    LPRINT CHR$(9); SPC(4);
    LPRINT CHR$(27); "L"; CHR$(128); CHR$(2);
    FOR COL% = 0 TO 640
      BYTE% = 0
      FOR PIXEL% = 0 TO 7
        IF POINT(COL%,ROW%+PIXEL%) > 0 THEN
          BYTE% = BYTE% OR 2^(7-PIXEL%)
        END IF
      NEXT PIXEL%
      LPRINT CHR$(BYTE%);
    NEXT COL%
    LPRINT CHR$(27); "J"; CHR$(24);
  NEXT ROW%
END SUB
```

**Figure 1:** This QuickBASIC 2.0 program displays 100 random circles on an EGA and then prints the screen on an IBM Graphics Printer or compatible.

## ■ PC TUTOR

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```

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A
JMP      $1C2          ; Jump INITIALIZE
DW       $0,00
DB       $2,$D,$A
DB       $9,$9,$2,$2,$2,$2,$1B,$4C,$8,$2
DB       $3,$1B,$4A,$18
PUSH     AX            ; NEWINT5:
PUSH     BX
PUSH     DS
MOV      AH,$F         ; Get Video Mode
INT      10
AND      AL,$7F        ; Strip High Bit
CMP      AL,$8F        ; If below 15
JB       $135          ; do OLDINT5
CMP      AL,$18        ; if above 16
JA       $135          ; do OLDINT5
MOV      AX,$0050      ; Print-Screen data
MOV      DS,AX
CMP      BYTE PTR [$0000],01
JNZ      $13D          ; if busy, do not
POP      DS            ; print
POP      BX
POP      AX
CS:
JMP      FAR [$103]     ; Do OLDINT5
MOV      BYTE PTR [$0000],01 ; Set busy
STI
PUSH     CX
PUSH     DX
MOV      BX,$107       ; Initial String
CALL     $199          ; Call PRINTSTRING
SUB      DX,DX          ; Row Register
MOV      BX,$10A       ; Row Beginning String
CALL     $199          ; Call PRINTSTRING
SUB      CX,CX          ; Column Register
MOV      BX,$0008      ; Dots per byte
PUSH     BX
SUB      BH,BH
MOV      AH,$D
INT      10            ; Read dot
POP      BX
CMP      DX,$15E       ; See if above row 350
JNB      $169          ; if so, no dot
CMP      AL,$1         ; See if dot is black
CMC
RCL      BL,1          ; Slide in bit
INC      DX            ; Next row

DEC      BH            ; 1 less row
JNZ      $158          ; Do next row
MOV      AL,BL
CALL     $1A8          ; 8 row byte
SUB      DX,$08        ; Call PRINT
INC      CX            ; Back 8 rows
INC      CX            ; Next column
CMP      CX,$280       ; See if below 640
JB       $155
MOV      BX,$114       ; End of row string
CALL     $199          ; Call PRINTSTRING
ADD      DX,$08        ; Up 8 rows
CMP      DX,$15E       ; See if above 350
JB       $14D          ; if not, next 8 rows
MOV      BYTE PTR [$0000],00 ; Not busy
POP      DX
POP      CX
POP      DS
POP      BX
POP      AX
IRET
CS:
; Return
; PRINTSTRING:

```

(Figure 2 continues)

Figure 2: This DEBUG script creates EGAGRAF.COM, a resident program that prints EGA 640 by 350 graphics displays on an IBM Graphics Printer or compatible.

## ■ PC TUTOR

```

MOV CL,[BX]
SUB CH,CH
INC BX
CS:
MOV AL,[BX]
CALL $1AB ; Call PRINT
LOOP $19E
RET
PUSH DX ; PRINT:
SUB DX,DX
SUB AH,AH
INT 17 ; BIOS Print Char
TEST AH,29
POP DX
POP AX
JZ $1C1
MOV BYTE PTR [0000],FF ; Error
ADD SP,#2
JMP $193 ; And exit
RET
MOV AX,3505 ; INITIALISE:
INT 21 ; Get Old Int 5
MOV [0103],BX ; Save it
MOV [0105],ES
MOV DX,0118 ; Set NEMINT5
MOV AX,2505
INT 21
MOV DX,$1C2 ; Terminate and
INT 27 ; remain resident

RCK
DC
W
Q

```

(Figure 2 ends)

routine works only with the IBM Graphics Printer and compatibles. The line

```
LPRINT CHR$(27); "L"; CHR$(128); CHR$(2);
```

switches to the 120-dot-per-inch graphics mode and prepares the printer to accept 640 bytes of graphics data. The horizontal resolution of the EGA graphics modes 15 and 16 (represented in BASIC as 10 and 9) is 640. The 640 is calculated from the last two numbers in the CHR\$ functions: 640 equals 2 times 256 plus 128.

■ Keeping the graphics screen dump in the same BASIC program that generates the graphics has some significant advantages.

Each of the 640 bytes of graphics data sent to the printer contains 8 bits, 1 for each of 8 vertical pixels. The byte is assembled by reading the pixels from the screen using the POINT function. Any pixel that is black gets a bit set to 0. Any pixel that is not black gets a bit set to 1. This byte is then sent to the printer:

```
LPRINT CHR$(BYTE%);
```

After a whole row of 640 bytes has been sent to the printer, 8 of the 350 display scan lines have been printed, and it is time to do a carriage return. Since the vertical resolution of the IBM Graphics Printer is 1/2 inch, 8 dots are 1/4 inch high, which means the line spacing must be 2 1/2 inch:

```
LPRINT CHR$(27); "J"; CHR$(24);
```

Now it's time for the next 8 rows of pixels.

Keeping the graphics screen dump in the same BASIC program that generates the graphics has some significant advantages. Your program can control when the screen is printed. You could pass parameters to the subroutine to print only part of the screen, or you could print it over at the

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## ■ PC TUTOR

left or right of the page and add some text in the margin.

If you'd rather have a graphics screen dump routine triggered by a Shift-PrtSc, however, Figure 2 shows a DEBUG script

that creates EGAGRAF.COM. This is a remain-resident program that works only with the IBM Graphics Printer and compatibles. Type the lines shown into a file called EGAGRAF.SCR. You don't

need to type the semicolons or the comments following them. Then run

DEBUG <EGAGRAF.SCR

This creates EGAGRAF.COM. After loading, this program remains resident in memory until you reboot. When you hit the Shift-PrtSc combination in video mode 15 (equivalent to BASIC's mode 9, i.e., EGA 640 by 350 graphics on a monochrome display) or 16 (BASIC's mode 10, i.e., EGA 640 by 350 graphics on an Enhanced Color Display), the resident program will print the contents of the screen.

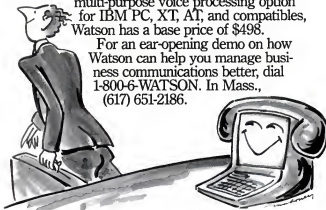
Like the QuickBASIC subroutine shown in Figure 1, EGAGRAF.COM prints a dot for every color except the background. This causes white-on-black graphics (or, in the case of the monochrome display, green-on-black graphics) to be printed as black on white. This reversal of colors is

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- Like the QuickBASIC subroutine shown, EGAGRAF.COM prints a dot for every color except the background.

normal when printing graphics. If you want black printed as black and all other colors not printed, change the CMC line to NOP, instead.

People who would like to print their graphics screens from Microsoft Windows should obtain a copy of a Windows utility called SLAP2. This utility is available from both the Windows SIG on CompuServe and the Windows program library on Genie (on information service run by General Electric).

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# Ctrace

253	main	[variables]	extern	unsigned char	1 8 2 3
76	x[2][0]=	.01;x[2][1]=.01;x[2][2]	today's.month		9
77	x[3][0]=	.02;x[3][1]=.02;x[3][2]	today's.day		23
78	printf("\n\nThe X matrix is");		today's.year		86
79	for(n1=0;n1<a;n1++) {		x[0][0] changed value		
80	for(n2=0;n2<a;n2++)		y[0][0] changed value		
81	printf("\n\nx[%d][%d] is %f		x1 = 2.00000e+00		
82	}		x3 < 0.30000e+00		
83	/* slash is at left hand end ~		n1 > 9		
84	for(n1=0;n1<a;n1++) {		n3 >= 33		
85	for(n2=0;n2<a;n2++) {				
86	if(n2==p1)				

## MATRIX INVERSION

Run number is 1

The X matrix is

x[0][0] is 1.000000  
x[0][1] is 0.040000  
x[0][2] is 0.030000  
x[0][3] is 0.020000  
x[1][0] is 0.020000

ptr	0x03f8
ptr->month	9
ptr->day	23
ptr->year	86
ptr->name[0]	'S'
ptr->name[1]	'e'
ptr->name[2]	'P'
ptr->name[3]	'\x00'
f	9.78865e-03
t	9.99909e-01
x[0][0]	1.00000e+00

The perfect companion for MIX C has arrived. MIX C makes it easy to write C programs. Now Ctrace makes it easy to get them working. Introducing Ctrace, the exciting new C source debugger with animated trace.

### FUN AND EASY

Ctrace makes it so easy to debug your C programs that you'll love doing it! You no longer have to mess with assembly language or hex addresses. Ctrace presents your program in a form that's instantly familiar. Your C source code is displayed just as you wrote it. All your variables are displayed just as you named them. And wait till you see your program in action. Ctrace brings it to life on the screen. You'll see your variable values changing as you watch your source code executing. Ctrace shows you how your program works, or why it doesn't work. After one session with Ctrace, you'll wonder how you ever programmed in C without it.

### UNIQUE ANIMATED TRACE

Ctrace has a unique animated trace feature that shows you the flow of execution in vivid detail. Not just line by line, but statement by statement. It's like watching the bouncing ball as the cursor moves over your C source code, highlighting each statement as it executes. Press the space bar to execute one statement at a time, or press the return key and watch it go. It's exciting and educational. Who says learning has to be boring?

### SIMPLE OPERATION

Ctrace is easy to operate too. Commands are executed with a single keystroke. Help screens are available if you forget a command. Pop up menus list command options. You simply position the cursor to the desired option and press the return key. Pop up messages alert you when anything important happens. To use Ctrace, simply compile your program with the trace option turned on. The executable program file is created as normal. Ctrace doesn't affect the size or the behavior of the program. You can execute your program with or without the help of Ctrace.

### 4 VIEWS AT ONCE

Ctrace maintains 6 windows of information: source, output, variables, watch, symbols, and memory. You can view as many as 4 windows at the same time. The source window (top left) shows your C program. The output window (bottom left) shows the screen output from your program. The variable window (bottom right) shows all the variable names and values. The watch window (top right) shows the variables that you select along with any conditions you've defined. The symbols window shows the addresses of variables and functions. The memory window shows any area of memory using data types that you select. Eight different screen layouts are available at the touch of a key. You can even define your own screen layouts.

### COMPLETE PROGRAM CONTROL

Ctrace gives you complete control of your program. Execution options are single step, trace speed, and full speed. You can insert breakpoints on an unlimited number of statements. Execution is temporarily halted when a break point is hit. You can then

snoop around and see what your program has done to that point. You can even trace the flow of control backwards to see how your program got there. You can insert watch points on variable values. When the value of a variable satisfies the conditions you've defined, execution halts to let you examine your program. You can trace all functions or select just the ones you want to see.

### THE RIGHT PRICE

If you could buy a debugger like Ctrace anywhere else you would expect to spend major bucks. Fortunately nobody else has a debugger like Ctrace. It's only available from MIX Software. And that's great news because you know our prices are right. Ctrace is an incredible value at only \$39.95. That's Right.

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Source window with profile count showing number of times each statement has executed. Pop up message indicates break point has been hit.



Source and variables windows shown side by side. Pop up message indicates that a watch point condition has been satisfied.



Source, variables and memory window. Memory window lets you view any area of memory using any data type.



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# C for yourself

## THE C COMPILER

You can see that Crace is not your typical debugger. It's easy to understand and simple to operate. Like wise, MIX C is not your typical C compiler. It's small and fast. In fact it's the only full feature C compiler that can be operated comfortably on floppy disks. And as you would expect, MIX C is easy to use. It produces a complete program listing with all errors clearly identified and explained.

Although it's small, MIX C is not a subset. MIX C supports the full K&R standard, including the extensions that are often omitted in other C compilers. MIX C comes complete with a comprehensive 460 page book, a library of more than 175 functions, a blazingly fast linker, and tools for optimizing your programs for minimal space or maximum speed. All of this is yours for the incredibly low price of \$39.95. That's little more than the cost of most C books alone.

If you're just learning C, MIX C is your fastest, easiest and cheapest way to master the language. If you've been frustrated by other C compilers, don't throw in the towel until you've tried ours. There's a world of difference. Our book includes a well written tutorial with lots of example programs. Our compiler includes the machine specific functions you need so you won't have to write them yourself. Compile and link operations take half as long with MIX C. That means you'll get your programs up and running twice as fast.

## THE ASM UTILITY

Our ASM utility is available if you want to link assembly language functions to your C programs. It works with Microsoft's MASM or M80

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## THE SPLIT-SCREEN EDITOR

Another great companion to the MIX C compiler is our split screen editor. It makes writing programs even faster and easier. With the MIX Editor, you can compile, link, and execute your program at the touch of a key. Compiling is fast because the MIX C compiler reads the program directly from memory. Correcting errors is easy because the editor automatically positions the cursor to the first error in the program.

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MSDOS: PC DOS 2.0 or higher  
128K Memory  
1 Disk Drive  
or CP/M 2.2 or higher (280)  
55K Memory  
1 Disk Drive (2 recommended)

**System Requirements**  
Crace  
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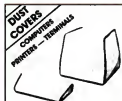
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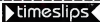
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**In this Issue!** Here's your chance to have all the facts, figures, and specifications about the products or services advertised or mentioned in this issue of PC Magazine. Absolutely free of charge!

Just complete the attached card. We'll notify the manufacturers or distributors so you can receive your free brochures directly from them.

**1** Fill in your name and address and check off your answers to the three research questions. (One card per person, please.)

**2** Circle the numbers on the card that correspond to the ads or articles you'd like more information about. (Numbers for advertised products are repeated in the Advertiser Index as well.)

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- 1) For which of the following products are you involved in selecting brands/modals to be bought by your company or organization? (check all that apply)

**Hardware**

- a. ☐ Mainframe
- b. ☐ Min
- c. ☐ PC
- d. ☐ Printer/Plotters
- e. ☐ Monitors
- f. ☐ Terminals
- g. ☐ Modems

- h. ☐ Hard Disk/Tape Back up
- i. ☐ Add-in Boards
- j. ☐ LANs
- k. ☐ Micro-Manframe Links

**Software**

- l. ☐ Communications
- m. ☐ Accounting
- n. ☐ Spreadsheets/Financial Planners
- o. ☐ Project Managers
- p. ☐ Word Processors
- q. ☐ Database Managers
- r. ☐ Graphics

- 2) Your primary job function is (check)
- s. ☐ Administrative/General Management
  - t. ☐ MIS/DP, Communications Systems, Programming
  - u. ☐ Engineering/R&D
  - v. ☐ Finance/Accounting
  - w. ☐ Marketing/Sales

- 3) Next step after information is received:
- x. ☐ Purchase Order
  - y. ☐ Evaluation
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PC122/1

Are you frequently called upon to give advice about PC products? Is it your responsibility to make PC hardware, software and peripherals selections?

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ber that corresponds to the ad or article that interested you. We'll forward your name to the manufacturers or distributors so they can send you the literature you need.

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that although the microcomputer industry gives birth to many superb products, it also produces a raft of indistinguishables, and noncompatibles. Their job—should they wish to keep it—is to tell the difference.

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## COMING UP

### DESKTOP PUBLISHING NEWS

PC Magazine called desktop publishing 1986's "Trend of the Year," and it looks like 1987 will be the year in which this new technology moves from the cutting edge to the mainstream. Diane Burns and S. Venit review five popular page composition software packages and test their capabilities by using them to produce a newsletter. Also included: a look at three page description languages, a glossary of desktop publishing terms, and some clever suggestions for bridging the compatibility gap between the Apple Macintosh and the PC.

**HARD DISK CARDS** Since Plus Development introduced the HardCard, dozens of other companies have entered the hard disk card market. Winn L. Rosch reviews 14 of the newest hard cards in terms of power, space, speed, and capacity.

**MEMORY WITHOUT A BOARD** If you do not need extra memory often enough to justify laying out big bucks for an expanded memory board or if you have run out of slots in your PC, then low-cost expanded-memory-emulation software may be the solution to your problem.

**NEW INTEGRATED SOFTWARE** Programs that promise spreadsheet, word processing, database, and telecommunications capabilities for under \$200 seem to answer users' demands for less expensive, hard-working integrated software. But do they deliver performance that is equal to their higher-priced, high-quality counterparts, such as *Symphony*, *Enable*, and *Framework*?

**CONNECTIVITY CONTINUED** Fox Research Corp.'s 10-NET cuts shopping time in half with its networking package that provides you with everything you need to equip a workstation. Our expert on connectivity, Frank J. Derfler, Jr., will let you know if 10-NET is equally timesaving in other areas.

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